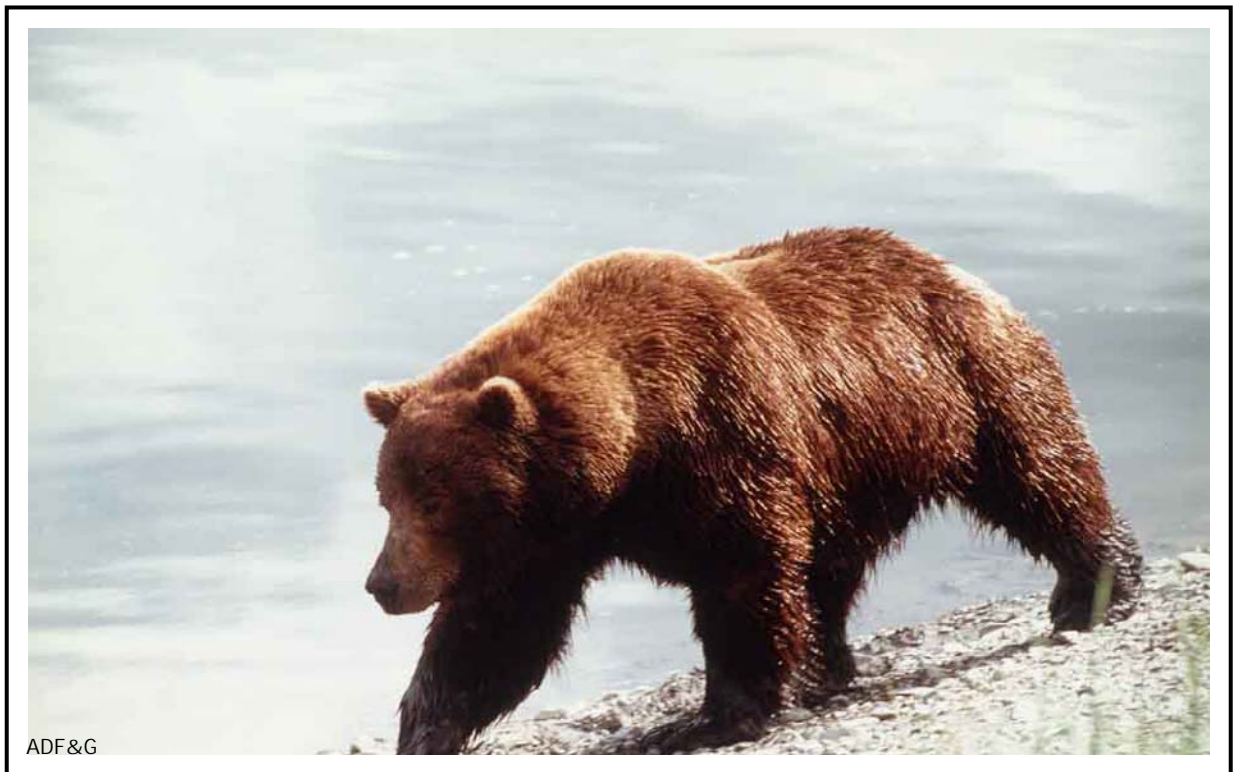


Brown Bear Management Report

of survey-inventory activities
1 July 1998–30 June 2000

Carole Healy, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation
December 2001



Please note that population and harvest data in this report are estimates and may be refined at a later date.

If this report is used in its entirety, please reference as: Alaska Department of Fish and Game. 2001. Brown bear management report of survey-inventory activities 1 July 1998–30 June 2000. C. Healy, editor. Project 4.0. Juneau, Alaska. 324 p.

If used in part, the reference would include the author's name, unit number, and page numbers. Authors' names can be found at the end of each unit section.

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SPECIES
MANAGEMENT REPORT

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 12 (9978 mi²)

GEOGRAPHIC DESCRIPTION: Upper Tanana and White River drainages; includes the northern Alaska Range east of the Robertson River and the Mentasta, Nutzotin, and northern Wrangell Mountains

BACKGROUND

Grizzly bears are distributed throughout most of Unit 12. The only areas (approximately 2500 mi²) not commonly used by bears are dominated by high mountains (>7000 ft), devoid of vegetation, or covered by large ice fields. Little is known about historical population trends, but based on harvest data, most of the unit probably supported densities of grizzly bears not limited by harvest. In those portions of the unit that were mined extensively or had human settlements, the bear population was regulated at lower levels.

Since 1900, grizzly bears have been actively sought by hunters and periodically by miners in southeastern Unit 12. Bear hunting regulations became more restrictive at the time of statehood until the early 1980s as guiding activity increased in the unit. During the 1970s, the unit's moose population declined substantially and grizzly bears were found to be an important predator on moose calves. In an attempt to obtain elevated moose calf survival in Unit 12, grizzly bear hunting regulations were liberalized in 1981 with the intent of reducing the bear population. Research from a Southcentral Alaska study indicated that when the grizzly bear population was reduced by at least 60%, moose calf survival increased significantly (Ballard and Miller 1990). Harvest was not expected to reduce the grizzly bear population at that level but the hypothesis was that, because the sustainable harvest of grizzly bears is low (5–8%), some population reduction would occur and perhaps result in increased moose calf survival.

During the mid-1980s, bear harvests increased by 29% in Unit 12 in response to the more liberal seasons and bag limits. Concurrently, the survival of moose calves to 5 months of age improved in western Unit 12 where bear harvest was high, and the moose population throughout Unit 12 slowly increased. However, moose calf survival also improved in portions of the unit where little bear harvest occurred. During the early 1990s annual moose calf survival declined or remained stable. Management objectives called for elevated grizzly bear harvests until moose numbers approached stated objectives or harvest levels were too high to ensure the viability of the bear population. During the 1990s it seemed that reducing the grizzly bear population by harvest was not having the desired effect on moose calf survival.

Also, further analysis of the southcentral data found no evidence that bear reduction contributed to the moose population increase (Miller and Ballard 1992). In response, management objectives were changed to offer the greatest amount of hunting opportunity while ensuring protection of the Unit 12 grizzly bear population.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Provide maximum opportunity to hunt grizzly bears in Unit 12.

MANAGEMENT OBJECTIVE

- Manage harvests so 3-year mean harvests do not exceed 28 bears and include at least 55% males in the harvest.

METHODS

All grizzly bears taken in Unit 12 must be sealed before being transported from the unit. During the sealing process we take skull measurements, determine the sex of each bear, extract a premolar tooth, and collect information on date, specific location of harvest and time spent afield by the hunter. Premolar teeth were sent to Matson's Laboratory (Milltown, Montana USA) to determine age. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

In summer 2000 we established 5 permanent blueberry sample areas in Unit 12 and 3 in adjacent Unit 20E to assess annual berry abundance. Each area has 5 1-m² plots. Plots were not selected randomly but by the presence of blueberry plants. We selected for a variety of habitat types, aspects, elevations, and slopes. We placed a rain gauge at each site. Each year we will monitor rainfall and temperatures to determine the effects on blossom and berry production. To measure berry production, we will count the number of berries within each plot at the same time each year. Over time we hope to compare berry production between years and sites and evaluate the effects of berry abundance on bear harvest and the number of problem bear incidents.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

I estimated the fall 2000 Unit 12 grizzly bear population was 350–425 bears (46.6–56.7 bears of all ages/1000 mi²; 18.0–21.9 bears of all ages/1000 km² in useable habitat), and the population trend was stable. My estimate was based on extrapolations from density estimate surveys conducted in similar type habitats in Interior and Southcentral Alaska (Reynolds and Boudreau 1992; Miller et al. 1997) and on harvest distribution, and sex and age composition of the harvest. My estimate of population trend was based on harvest statistics (total harvest, sex ratio, average skull size, and age of harvested bears), and informal public surveys.

Based on harvest data, grizzly bear numbers were reduced in portions of Unit 12 due to high harvest between RY73 and RY82. During that period, annual harvests averaged 20.1 bears/year, and the kill was primarily from the northern Wrangell Mountains, Mentasta Mountains, and the Tok River drainages. Much of Unit 12 is difficult to access and, consequently, harvest by residents is concentrated in the few accessible areas. Guides also hunt primarily in these areas but stay separate from resident hunters by using areas that have restricted access due to landownership patterns.

Between RY84 and RY87, estimates of grizzly bear numbers in accessible areas continued to decline due to increased harvest ($\bar{x} = 26$ bears/yr) that followed more liberal harvest regulations. Since RY88, harvest declined to 15.3 bears/year. Harvest distribution remained relatively the same. Average skull sizes of harvested males did not change from RY73 through RY83 (20.8 in) and RY87 through RY99 (20.8 in). Average skull size (19.6 in) was smaller during RY84 through RY87. The primary difference between the periods was that from RY84 through RY87 no grizzly bear tag fee was required.

Based on kill density (number of harvested bears/10,000 mi²), bear numbers were reduced in the more accessible areas in Unit 12 between RY73 and RY86. The estimated kill density within selected portions of the unit was high and ranged from 10.6 bears/10,000 mi² (4.1 bears/10,000 km²) in the northern Wrangell and Mentasta mountains to 9.3 bears/10,000 mi² (3.6 bears/10,000 km²) in the Tok River drainages. In Unit 20A a kill density of 0.8 bears/10,000 mi² (2.2/10,000 km²) occurred during a period when the bear population declined by 28% (Reynolds, unpublished data). Since RY87 harvest has declined in the accessible areas and also in the remainder of Unit 12 (5875 mi²) and the average kill density declined to 0.2 bears/10,000 mi² (0.4 bears/10,000 km²).

Based on total harvest, percent of females >5 years old, and harvest location during RY98–RY00, the Unit 12 grizzly bear population was stable at a reduced level compared to the early 1970s. Comments received from long-term guides and hunters in the area support this assessment.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident	Nonresident
	Open Season (Subsistence and General Hunts)	Open Season
Unit 12, 1 bear every regulatory year	1 Sep–31 May (General hunt only)	1 Sep–31 May

A bear taken in this unit did not count against the bag limit of 1 bear every 4 years in other units; however, no person could take more than 1 bear statewide per regulatory year. During the report period a \$25 resident tag fee was required to hunt grizzly bears in Unit 12.

Board of Game Actions and Emergency Orders. No regulatory changes for grizzly bears in Unit 12 occurred during RY98–RY00. The tag fee requirement was waived in southeastern Unit 20D annually during the board’s spring 1995 through spring 2001 meetings, which potentially could have affected the grizzly bear numbers in adjacent northwestern Unit 12. Based on harvest distribution in Unit 20D, this regulatory change has had little effect on Unit 12 grizzly bears (DuBois, ADF&G, personal communication).

The Board of Game designated the Unit 12 moose population as important for high levels of human consumptive use under the Intensive Management Law. This designation means that the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because the population is depleted or has reduced productivity. This decision may affect the Unit 12 brown bear population in the future if further brown bear population reduction is deemed appropriate to benefit moose.

Hunter Harvest. Based on the estimated grizzly bear population size, and research conducted in Unit 20A (Reynolds, ADF&G, personal communication), the Unit 12 sustainable harvest was 28 bears, of which 6 can be adult females (>5 years old). During RY98–RY00 hunters reported taking 17 (RY98), 16 (RY99), and 28 bears (RY00, preliminary harvest total) of which 9, 9, and 11, respectively, were females (Table 1). Ages of harvested bears were not available after fall 1998 for this report. Three of the 4 females taken during fall RY98 were <5 years old. The 3-year average (RY97–RY99) harvest was 14.7 bears. The percent males in the harvest during this period were 85%, 47%, and 44%, respectively, and the 3-year average was 59%, exceeding the harvest objective. I do not know if females were more vulnerable during fall 1999 or it was an artifact of low sample size. In 2000 the preliminary reported fall harvest comprised of 61% male and the distribution of harvest was comparable.

In Unit 12 an assortment of season and bag limit requirements were tried to increase the grizzly bear harvest and reduce the population size. Increasing the bag limit to 1 bear/year in 1982 resulted in little change in harvest. During RY84 and RY85, the grizzly bear tag fee requirement was waived and harvest increased to 30 and 29 bears, respectively. The greatest increase in harvest was during spring 1984, indicating the increase in harvest was not incidental to moose and caribou hunts, but was due more to advertising of the area and to the tag fee exemption. Since RY92, the bag limit has been 1 bear/year and a tag fee was required. Similar to RY82 and RY83, harvest has remained unchanged and comparable to the 2 years when the bag limit was 1 bear every 4 years.

If further reduction of bear numbers through increased harvest is desired in Unit 12, the tag fee would have to be eliminated and accompanied by an intensive public awareness campaign. Even then, based on results from other areas with liberal brown bear harvest regulations, hunter demand will be satisfied and harvest will stabilize or decline within a few years and little to no increases in moose calf survival will occur (Gardner 1999). As the number of areas where tag fees are waived and bag limits increase, it may be less likely that hunters will be drawn to a specific area. In Unit 12 and in adjacent Unit 20E, the 1 bear/year

bag limit offers increased hunting opportunity and ensures adequate protection to the brown bear population.

Hunter Residency and Success. Historically, nonresidents harvested most of the grizzly bears in Unit 12. Before RY82, nonresident hunters took 63% of the harvested grizzly bears. During RY82 through RY91, resident harvest increased as a result of the regulation changes that allowed 1 bear/year and, periodically, no tag fee. During that period, residents took 66% of the bear harvest. During spring 1991 the bag limit reverted to 1 bear/4 years and resident harvest began to decline (Table 2). Since RY92, nonresidents have taken 59% of the harvest even though more liberal regulations favoring residents were reenacted. Preliminary harvest data indicates nonresidents took 64% of the fall RY00 harvest. During RY98 and RY99, nonresidents took 57% of the fall harvest and 55% of the spring harvest. Based on discussions with local and nonlocal Alaskan residents, the 2 reasons why they do not take more brown bears while hunting Unit 12 is because they have already harvested a grizzly bear or because they are not interested in taking a bear while hunting moose or sheep. Some hunters state they would take a brown bear if the tag fee was eliminated.

Harvest Chronology. During RY98 and RY99, 56–63% of the harvested grizzly bears were taken during September. In RY00, preliminary harvest data indicates 89% of the fall harvest was taken during September. The 5-year average for September was 69% (Table 3). Historically, most of the harvest was taken during September when most resident moose and caribou hunters and guided hunters are afield. During RY98–RY00, there was an increased interest in spring bear hunting in Unit 12, particularly by guided nonresident hunters.

Transport Methods. During RY98 and RY99, most successful brown bear hunters used horses or airplanes to access the area (Table 4), which is similar to historical patterns. Hunters using 3- or 4-wheelers as their primary transportation during the past 12 regulatory years have harvested only 12 bears. Few trails exist in Unit 12 that give bear hunters using this type of transportation an advantage. Almost exclusively, the use of horses was by guided nonresident hunters within the Nabesna, Chisana, and Whiter River drainages.

Other Mortality

Intraspecific mortality inflicted by adult male bears is probably the greatest source of nonhunting bear mortality in Unit 12. Incidence of brown bears taken in defense of life or property (DLP) incidents was minimal. Numerically, a higher number of brown bears were taken under DLP during fall RY00, but all were taken during 1 incident. A female with 2 cubs entered a home in Northway and were shot.

HABITAT

Assessment

Unit 12 offers moderate-quality brown bear habitat with the exception of 2500 mi² of unvegetated mountaintops and ice fields. Bear habitat remained relatively undisturbed, except near a few small communities, the Alaska Highway, and the Tok Cutoff. Like most other areas in Interior Alaska, streams in Unit 12 do not contain reliable seasonal salmon runs that are accessible to bears.

We established the 5 blueberry sample areas in Unit 12 during July 2000 (Table 5). Based on discussions with local berry pickers, hunters, and hikers, blueberries were locally abundant in 2000, but overall it was a sparse year. Based on the first year's data, blueberries were more common in the higher elevations but were patchy in distribution and uniformly sparse in the lower elevations. We established the sample areas during early July and could not determine blossom production. Our objective is to annually monitor blossom and berry production in these areas of Units 12 and 20E.

Enhancement

Maintenance of a near-natural fire regime through provisions of the *Alaska Interagency Fire Management Plan: Fortymile Area* was the primary action taken in the unit to restore habitat diversity and productivity for all species. In areas that are under full fire suppression, other habitat enhancement methods are being considered. A cooperative ADF&G/Alaska Department of Natural Resources logging project is being planned for the Tok River valley. If implemented, clear cuts of 20–80 acres will be treated to enhance regeneration of deciduous shrubs to mimic natural succession. About 1000 acres will be logged and treated during a 5- to 10-year period. Bears and their prey species are expected to benefit.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The initial objective for liberalizing grizzly bear harvest regulations in Unit 12 in RY82 was to cause a temporary reduction in the bear population to benefit moose calf survival. Moose calf survival increased beginning in the mid-1980s in the areas of the greatest bear harvest. However, we also found that calf survival increased in areas that received little bear harvest in adjacent Unit 20E. After monitoring this management technique for 15 years in Unit 20E and 13 years in Unit 12, I believe that reducing the grizzly bear populations by harvest in portions of these units is not effective in causing an increase in moose calf survival.

Reducing predator populations through conventional hunting and trapping is currently a socially accepted method of predator control. The public believes this method achieves increased moose survival and commonly ask for more bear reduction programs to be initiated. In order to maintain credibility with the public and the scientific community, we need to determine if and when this method is effective in increasing ungulate populations and present these findings to the public. This information will become especially important as more ungulate populations in Alaska are managed under the intensive management law.

During this period of liberal grizzly bear regulations in Units 12 and 20E, we learned that we can offer increased hunter opportunity and, with a few additional safeguards, still ensure adequate protection to the bear population. In Unit 12, based on the current estimated population size, 28 bears, including a maximum of 6 adult females, can be harvested annually without resulting in a bear population decline, assuming that harvest is evenly distributed in the unit. During the past 19 years, the annual female quota has been exceeded only once, and the overall quota 3 times. However, harvest has not been evenly distributed and has caused localized population declines and probable attendant changes to the sex and age composition (Gardner, ADF&G unpublished data). Based on Unit 12's harvest history, we can continue to offer liberal seasons and bag limits but eventually may need to develop techniques that will

result in more even distribution of harvest. Harvest strategies should be developed by regional research biologists that allow for maximum hunter opportunity and adequate protection to the grizzly bear population, while being user-friendly to the hunter and the area management biologist.

CONCLUSIONS AND RECOMMENDATIONS

Grizzly bears continue to be well distributed throughout Unit 12. The 2000 population estimate was 350–425 bears (46.6–57.7 bears of all ages/1000 mi²; 18.0–21.9 bears of all ages/1000 km²) and the population trend was estimated to be stable. Harvest regulations were liberal and allowed for maximum hunting opportunity. During the 1980s, due to uneven harvest distribution, bear numbers declined and population sex and age composition changed in the northern Wrangell and Mentasta Mountains, in the Tok River drainages, and near the permanent Unit 12 communities. Harvests have declined since 1988 and bear population declines have ceased, but the population probably is still dominated by young males.

The objectives to limit harvests so the 3-year mean harvest does not exceed 28 bears and has at least 55% males in the harvest was met. Both RY98 and RY99 had female harvests higher than desired. The greatest female harvest occurred during fall 1999. Five of the female bears were taken by residents and 3 by guided nonresidents. Five of the females were taken in the areas that historically have received the greatest harvest. Preliminary harvest data from fall RY00 indicates that males comprised 61% of the harvest with a similar harvest distribution. During the next year, I will monitor the harvest sex ratio closely from the Nabesna, Chisana, and White River drainages to determine if harvest restrictions are necessary to protect the female component of the population. Results will be included in the 2002 management report.

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Table 1 Unit 12 grizzly bear mortality, regulatory years 1989–1990 through autumn 2000

Regulatory year	Reported							Estimated kill		Total estimated kill					
	Hunter kill				Nonhunting kill ^a					M	(%)	F	(%)	Unk	Total
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal						
<i>1989–1990</i>															
Autumn 1989	5	6	0	11	0	0	0	0	0	5	(45)	6	(55)	0	11
Spring 1990	2	0	0	2	0	0	0	0	0	2	(100)	0	(0)	0	2
Total	7	6	0	13	0	0	0	0	0	7	(54)	6	(46)	0	13
<i>1990–1991</i>															
Autumn 1990	7	4	0	11	0	0	0	0	0	7	(64)	4	(36)	0	11
Spring 1991	2	3	0	5	0	0	0	0	0	2	(40)	3	(60)	0	5
Total	9	7	0	16	0	0	0	0	0	9	(56)	7	(44)	0	16
<i>1991–1992</i>															
Autumn 1991	3	4	0	7	1	0	0	0	0	4	(50)	4	(50)	0	8
Spring 1992	2	0	0	2	1	0	0	0	0	3	(100)	0	(0)	0	3
Total	5	4	0	9	2	0	0	0	0	7	(64)	4	(36)	0	11
<i>1992–1993</i>															
Autumn 1992	11	7	0	18	0	0	0	0	0	11	(61)	7	(39)	0	18
Spring 1993	4	2	0	6	0	0	0	0	0	4	(67)	2	(33)	0	6
Total	15	9	0	24	0	0	0	0	0	15	(63)	9	(37)	0	24
<i>1993–1994</i>															
Autumn 1993	8	7	0	15	1	0	0	0	0	9	(56)	7	(44)	0	16
Spring 1994	2	0	0	2	0	0	0	0	0	2	(100)	0	(0)	0	2
Total	10	7	0	17	1	0	0	0	0	11	(61)	7	(39)	0	18
<i>1994–1995</i>															
Autumn 1994	5	6	0	11	1	0	0	0	0	6	(50)	6	(50)	0	12
Spring 1995	2	1	0	3	1	0	0	0	0	3	(75)	1	(25)	0	4
Total	7	7	0	14	2	0	0	0	0	9	(56)	7	(44)	0	16
<i>1995–1996</i>															
Autumn 1995	4	2	0	6	0	0	0	0	0	4	(67)	2	(33)	0	6
Spring 1996	2	0	0	2	0	0	0	0	0	2	(100)	0	(0)	0	2
Total	6	2	0	8	0	0	0	0	0	6	(75)	2	(25)	0	8
<i>1996–1997</i>															
Autumn 1996	9	8	0	17	0	0	0	0	0	9	(53)	8	(47)	0	17
Spring 1997	3	1	0	4	0	0	0	0	0	3	(75)	1	(25)	0	4
Total	12	9	0	21	0	0	0	0	0	12	(57)	9	(43)	0	21
<i>1997–1998</i>															

Regulatory year	Reported							Estimated kill		Total estimated kill					
	Hunter kill				Nonhunting kill ^a					M	(%)	F	(%)	Unk	Total
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	(%)	F	(%)	Unk	Total
Autumn 1997	7	1	0	8	1	0	0	0	0	8	(89)	1	(11)	0	9
Spring 1998	3	0	0	3	0	1	0	0	0	3	(75)	1	(25)	0	4
Total	10	1	0	11	1	1	0	0	0	11	(85)	2	(15)	0	13
1998–1999															
Autumn 1998	6	4	0	10	0	1	0	0	0	6	(55)	5	(45)	0	11
Spring 1999	2	4	0	6	0	0	0	0	0	2	(33)	4	(67)	0	6
Total	8	8	0	16	0	1	0	0	0	8	(47)	9	(53)	0	17
1999–2000															
Autumn 1999	3	8	0	11	0	0	0	0	0	3	(27)	8	(73)	0	11
Spring 2000	4	1	0	5	0	0	0	0	0	4	(80)	1	(20)	0	5
Total	7	9	0	16	0	1	0	0	0	7	(44)	9	(56)	0	16
2000–2001 ^b															
Autumn 2000	15	10	0	25	2	1	0	0	0	17	(61)	11	(49)	0	28

^a Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

^b Preliminary harvest.

Table 2 Unit 12 grizzly bear successful hunter residency, regulatory years 1989–1990 through autumn 2000

Regulatory year	Unit resident	(%)	Other residents	(%)	Nonresident	(%)	Total successful hunters
1989–1990	6	(46)	3	(23)	4	(31)	13
1990–1991	2	(12)	7	(44)	7	(44)	16
1991–1992	0	(0)	3	(33)	6	(67)	9
1992–1993	7	(29)	6	(25)	11	(46)	24
1993–1994	1	(6)	6	(38)	9	(56)	16
1994–1995	2	(14)	1	(7)	11	(89)	14
1995–1996	0	(0)	1	(13)	7	(87)	8
1996–1997	5	(24)	4	(19)	12	(57)	21
1997–1998	4	(31)	1	(7)	8	(62)	13
1998–1999	1	(6)	5	(31)	10	(63)	16
1999–2000	3	(19)	5	(31)	8	(50)	16
2000–2001 ^a	1	(4)	8	(32)	16	(64)	25

^a Preliminary harvest.

Table 3 Unit 12 grizzly bear harvest chronology by month, regulatory years 1989–1990 through autumn 2000

Regulatory year	Harvest chronology by month									<i>n</i>
	Sep (%)	Oct (%)	Nov (%)	Apr (%)	May (%)	Jun (%)				
1989–1990	10 (77)	0 (0)	0 (0)	0 (0)	2 (15)	0 (0)				13 ^a
1990–1991	11 (69)	0 (0)	0 (0)	1 (6)	4 (25)	0 (0)				16
1991–1992	7 (64)	0 (0)	0 (0)	1 (9)	1 (9)	0 (0)				11 ^b
1992–1993	14 (58)	2 (8)	2 (8)	0 (0)	6 (25)	0 (0)				24
1993–1994	14 (82)	1 (6)	0 (0)	1 (6)	1 (6)	0 (0)				17 ^a
1994–1995	11 (73)	0 (0)	0 (0)	1 (7)	3 (20)	0 (0)				14 ^a
1995–1996	6 (75)	0 (0)	0 (0)	0 (0)	2 (25)	0 (0)				8
1996–1997	16 (76)	0 (0)	0 (0)	0 (0)	4 (19)	0 (0)				21 ^a
1997–1998	8 (62)	0 (0)	0 (0)	0 (0)	3 (23)	1 (8)				13 ^a
1998–1999	9 (56)	1 (6)	0 (0)	0 (0)	6 (38)	0 (0)				16 ^a
1999–2000	10 (63)	1 (6)	0 (0)	0 (0)	5 (31)	0 (0)				16
2000–2001 ^c	27 (96)	1 (4)	0 (0)	0 (0)	0 (0)	0 (0)				28 ^d

^a Includes 1 defense of life or property (DLP) bear. In RY1998 the DLP was taken in July and not included in this table.

^b Includes 2 DLP bears.

^c Preliminary harvest.

^d Includes 3 DLP bears.

Table 4 Unit 12 grizzly bear harvest by transport method, regulatory years 1989–1990 through autumn 2000

Regulatory year	Harvest by transport method										<i>n</i>
	Airplane	Horse	Boat	3- or 4- wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk		
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)		
1989–1990	4 (31)	2 (15)	1 (8)	0 (0)	1 (8)	4 (31)	0 (0)	0 (0)	1 (8)	13 ^a	
1990–1991	6 (38)	4 (25)	0 (0)	0 (0)	0 (0)	2 (13)	2 (13)	1 (6)	1 (6)	16	
1991–1992	6 (67)	2 (22)	0 (0)	0 (0)	1 (11)	0 (0)	0 (0)	0 (0)	0 (0)	9	
1992–1993	7 (29)	10 (42)	0 (0)	1 (4)	2 (8)	0 (0)	2 (8)	0 (0)	2 (8)	24	
1993–1994	2 (12)	7 (41)	0 (0)	2 (12)	0 (0)	0 (0)	2 (12)	3 (18)	1 (6)	17 ^a	
1994–1995	4 (29)	7 (50)	0 (0)	1 (7)	0 (0)	0 (0)	2 (14)	0 (0)	0 (0)	14 ^a	
1995–1996	1 (13)	7 (86)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8	
1996–1997	4 (19)	10 (48)	1 (5)	4 (19)	0 (0)	1 (5)	1 (5)	0 (0)	0 (0)	21	
1997–1998	2 (15)	8 (62)	1 (8)	0 (0)	0 (0)	0 (0)	0 (0)	2 (15)	0 (0)	13 ^b	
1998–1999	6 (35)	5 (29)	0 (0)	1 (6)	0 (0)	2 (12)	2 (12)	0 (0)	1 (6)	17 ^a	
1999–2000	5 (31)	8 (50)	0 (0)	3 (19)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	16	
2000–2001 ^c	6 (21)	12 (43)	1 (4)	4 (14)	0 (0)	0 (0)	2 (7)	3 (11)	0 (0)	28 ^d	

^a Includes 1 defense of life or property (DLP) bear.^b Includes 2 DLP bear.^c Preliminary harvest.^d Includes 3 DLP bears.

Table 5 Units 12 and 20E blueberry blossom and berry production sample areas, summer 2000

Area	Elevation n	Aspect	Slope	Primary vegetation	Rainfall (in)		No. berries/plot					
					Blossom production (May–Jun)	Berry production (Jul–Aug)	1	2	3	4	5	\bar{x}
Clearwater	1966	Flat	Flat	spruce/muskeg	— ^a	2.09	14	0	31	84	8	27.4
7-Mile	1859	Flat	Flat	spruce/willow	— ^a	2.26	0	1	2	0	0	0.6
Pipeline	1888	5–10	SSW	spruce/willow	— ^a	2.77	13	6	0	0	0	3.8
RCA	2197	15–20	N	spruce/alder	— ^a	— ^b	3	0	0	0	4	1.4
4-Mile	2300	5–10	S	spruce/tussock	— ^a	2.66	11	7	14	12	11	11.0
9-Mile	2722	5–10	NE	1990 burn/willow	— ^a	2.74	23	9	10	12	7	10.2
Ptarmigan	3643	10–15	W	willow/alder	— ^a	4.40	9	59	1	14	41	24.8
Fairplay	3640	10	SW	willow	— ^a	4.48	14	0	23	2	7	9.2

^a Rain gauges not working until after blossom production.^b Bear destroyed rain gauge.

SPECIES
MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 25526
JUNEAU, AK 99802-5526

BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNITS: 19, 21A and 21E (59,756 mi²)

GEOGRAPHIC DESCRIPTION: All Drainages of the Kuskokwim River upstream from the village of Lower Kalskag; Yukon River drainage from Paimiut upstream to, but not including, the Blackburn Creek drainage; the entire Innoko River drainage; and the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers.

BACKGROUND

Although grizzly bears are distributed throughout Units 19, 21A, and 21E, densities and interest in sport harvest varies. In higher elevations within the Alaska Range and associated foothills (Units 19B and 19C), there is moderate harvest pressure, mainly from nonresident, guided hunters. Harvest pressure is generally light in other portions of the units.

We have no population estimates in this area; thus, estimated densities are based on extrapolations from research in other areas. Harvests have generally fluctuated with season lengths and probably do not provide a good indication of population status or trend. During the first decade following mandatory sealing requirements, harvest was light, averaging about 15 bears annually. During the 1970s, harvest increased dramatically, but seasons were shortened severely, and as a result harvest declined by the early 1980s. Throughout the 1980s, harvests remained relatively low, with a slowly increasing trend until the late 1990s.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

That portion of Units 19D and 19A north of the Kuskokwim River and Units 21A and 21E

- Provide the greatest sustained opportunity to hunt brown bears.

Unit 19C

- Provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

Units 19A and 19B south of the Kuskokwim River and upstream from the Aniak River drainage

- Provide the opportunity to take large brown bears.

- Provide the opportunity to hunt brown bears under aesthetically pleasing conditions.

Western portion of Units 19, 21A within the Western Alaska Brown Bear Management Area, and 21E

- Provide for subsistence uses of brown bears.

MANAGEMENT OBJECTIVES

- Manage brown bear populations to sustain a mean annual harvest of no more than 70 bears with a minimum of 50% males in the harvest.
- Allow an increased legal harvest of brown bears in and around villages, fish camps, and other human habitations during open seasons to reduce human/bear conflicts during closed seasons.
- Increase reported harvest.

METHODS

Data from bear sealing certificates provided data on hunter demographics, sex ratio of the harvest, and timing and location of harvest. Information regarding harvest in the Western Alaska Brown Bear Management Area was also compiled. Harvest data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Composition

We completed no population surveys or censuses. However, I estimated the population based on known bear densities (Miller et al. 1997) in similar habitats in other game management units in Interior Alaska. The habitat in Unit 19A is of moderate quality, which would support a density of 20 bears/1000 mi², or 200 bears. Unit 19B probably contains about 7500 mi² of good quality bear habitat, with an estimated density of 40 bears/1000 mi² or 300 bears. Unit 19C has about 5200 mi² of good habitat (40 bears/1000 mi² = 210 bears) and about 1500 mi² of moderate habitat (20 bears/1000 mi² = 30 bears). Unit 19D generally contains poor habitat (13 bears/1000 mi² = 165 bears). Using these figures, my estimate was 900–1000 bears for Unit 19. Pegau (1987) estimated a total of 900 bears for the same area.

I used the same approach to estimate population size in Units 21A and 21E. The higher elevation areas are moderately good bear habitat, and low elevation areas are poor habitat. I used an estimated density of 25 bears/1000 mi² in moderately good bear habitat and 10 bears/1000 mi² in poor habitat. In Unit 21A there are about 4500 mi² of moderately good habitat (25 bears/1000 mi² = 113 bears) and about 11,500 mi² of poor habitat (10 bears/1000 mi² = 115 bears). The total population estimate for Unit 21A was therefore 225–275 bears. Unit 21E consists of about 1000 mi² of moderately good habitat (25 bear/1000mi² = 25 bears) and about

7000 mi² of poor habitat (10 bear/1000 mi² = 70 bears). The total estimate for Unit 21E was 90–125 bears.

My estimate for the entire 60,352-mi² area was 1200–1400 bears, with densities of 10 to 40 bears/1000 mi². The population was probably stable or slowly increasing during the past 10 years, based on field observations, nuisance reports, hunter harvest and sightings.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 19A and 19B within the Western Brown Bear Management Area.		
One bear every regulatory year by registration permit.	1 Sep–31 May (Subsistence hunt only)	No open season
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 19A outside the Western Brown Bear Management Area.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 19B outside the Western Brown Bear Management Area.		
One bear every 4 regulatory years	10 Sep–25 May	10 Sep–25 May
Units 19C, and 19D.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Units 21A and 21E.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May

Board of Game Actions and Emergency Orders. The Board of Game reauthorized the resident tag exemption for Unit 19D at their 2000 and 2001 meetings. Resident tag exemptions must be reauthorized each year by the board.

Hunter Harvest. Human use of the grizzly bear population was moderate (Table 1). Over the last 4 years there has been an increasing harvest trend for Units 19A, 19B, and 19C. The Unit 19A average harvest during RY92 through RY95 was 7.5 bears/year, and during RY96 through RY99 the average increased to 9.5 bears/year. In Unit 19B the RY92 through RY95 average harvest was 27.3 bears/year. It was stable at 28.8 bears/year from RY96 through RY99. In Unit 19C the RY92 through RY95 average harvest was 15.8 bears/year. It increased to 22.8 bears/year from

RY96 through RY99. In Unit 19D harvest was stable from 2.3 bears/year during RY92 through RY95 to 3.0 bears/year during RY96 through RY99. Unit 21A and 21E harvests have remained low and stable since RY92, with Unit 21A averaging 1.3 bears/year. There has been an increase in the Unit 21E harvest, with harvest averaging 3.8 bears/year in the period RY92 through RY95, increasing to 7.0 bears/year in the period from RY96 to RY99. The number of unreported bears taken at fish camps was unknown, but it was probably ≤ 10 bears/year.

The 5-year mean annual harvest (RY95 through RY99) in the entire area was 69.8 grizzly bears. The conservative estimate of sustainable harvest was 70–85 bears (6% of 1200–1400 bears) (Reynolds 1997). The harvests are now approaching the lower limit of the conservative sustainable levels based on the current population estimates.

Generally, the proportion of males in the reported harvest has been near 60% (Table 2). It was $< 50\%$ (44%) during only 1 of the past 10 seasons (spring 1997). The mean for the past 5 years was 62%. During the last 5 regulatory years the percent males varied from a low of 52% (RY96) to a high of 68% (RY97).

Generally, we assume that a preponderance of males in the harvest reflects a healthy population, given low to moderate hunting pressures. However, many Unit 19, 21A, and 21E grizzly bears are harvested on multi-species hunts, and hunters are not necessarily attempting to take a record-class animal. Therefore, harvest of females (except those with cubs or yearlings) is not avoided. Until grizzly bear hunting effort becomes more intensive, our management objective to harvest $> 50\%$ males should afford the protection needed to sustain the population, even if harvest levels exceed the guideline of 6% annual harvest of the estimated population.

Hunter Residency and Success. During the past 5 years, nonresidents harvested 221 of 265 bears (83%) (Table 3). This indicates a relatively high use of the area by brown bear guides and their nonresident clients. No information is available on success rates (i.e., number successful versus unsuccessful) for brown bear hunters in the unit. However, between 1995 and 2000, the mean number of days hunted annually by successful hunters fluctuated between 4.4 and 6.0 days.

Harvest Chronology. Most harvest occurred during fall (77%) (Table 4). The fall harvest was greater primarily due to guided hunts for multiple species. Guided hunters opportunistically kill bears while hunting ungulates. Little spring brown bear hunting occurs in this area, but spring harvests have increased from an average of 12.5 bears during April and May RY93 through RY96 to 17 bears for April and May RY97 through RY99.

Transport Methods. During the past 5 years, 73–96% of successful hunters used airplanes as their primary access method (Table 5). The proportion of hunters using aircraft has not changed significantly since sealing began.

CONCLUSIONS AND RECOMMENDATIONS

Seasons and bag limits allowed a moderate brown bear harvest and harvest data did not indicate a decline in the population. Therefore, additional harvest restrictions seem unnecessary. However, following the resident tag exemption in 1998, annual scrutiny of Unit 19D harvest data must occur and changes should be enacted if warranted. Preliminary results of the Unit 19D

moose calf mortality study indicate that grizzly bears are a significant cause of calf mortality in some areas of Unit 19D. This contradicts the previous assumption that grizzly bears were not a significant cause of moose calf mortality in Unit 19D and must also be considered when determining future season dates, bag limits, and resident tag exemptions.

Annual review of sealing certificate data will continue. If sex ratios in the harvest begin to favor females, changes in season lengths should be considered. Compliance with reporting requirements by local residents is low because of the regulation requiring a \$25 resident brown bear tag (except for resident hunting in the Western Alaska Brown Bear Management Area and in Unit 19D). During personal contacts in villages and fish camps we will also continue to emphasize the need to document harvests whether bears are taken under hunting regulations or Defense of Life or Property regulations.

We met our management objective to sustain a mean annual harvest of no more than 70 bears with a minimum of 50% males. We made progress increasing the reporting of bears taken by local residents. The Unit 19D resident tag exemption will probably aid in accomplishing this objective. To increase reported harvest, other parts of Units 19, 21A and 21E may warrant resident tag exemptions.

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SPECIES
MANAGEMENT REPORT

Alaska Department of Fish and Game
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Table 1 Units 19, 21A, and 21E grizzly bear harvest by season, regulatory years 1989–1990 through 1999–2000

Regulatory year	Unit 19					Unit 21		Totals
	A	B	C	D	Unk	A	E	
<i>1989–1990</i>								
Fall 1989	0	12	16	3	0	3	0	34
Spring 1990	0	3	0	0	0	0	3	6
Total	0	15	16	3	0	3	3	40
<i>1990–1991</i>								
Fall 1990	2	7	10	6	0	1	1	27
Spring 1991	0	8	4	1	0	1	2	16
Total	2	15	14	7	0	2	3	43
<i>1991–1992</i>								
Fall 1991	2	14	8	1	0	0	0	25
Spring 1992	2	4	1	1	0	0	5	13
Total	4	18	9	2	0	0	5	38
<i>1992–1993</i>								
Fall 1992	10	22	14	3	0	2	1	52
Spring 1993	1	6	1	1	0	0	4	13
Total	11	28	15	4	0	2	5	65
<i>1993–1994</i>								
Fall 1993	3	21	13	1	0	0	0	38
Spring 1994	1	4	1	0	0	0	4	10
Total	4	25	14	1	0	0	4	48
<i>1994–1995</i>								
Fall 1994	6	22	14	1	0	1	0	44
Spring 1995	2	4	2	1	0	2	4	15
Total	8	26	16	2	0	3	4	59
<i>1995–1996</i>								
Fall 1995	7	27	14	1	0	0	0	49
Spring 1996	0	3	4	1	0	0	2	10
Total	7	30	18	2	0	0	2	59
<i>1996–1997</i>								
Fall 1996	8	6	13	2	0	2	1	32
Spring 1997	1	7	6	0	0	0	2	16
Total	9	13	19	2	0	2	3	48
<i>1997–1998</i>								
Fall 1997	9	23	22	0	0	2	2	58
Spring 1998	1	4	3	0	0	0	8	16
Total	10	27	25	0	0	2	10	74
<i>1998–1999</i>								

Regulatory year	Unit 19					Unit 21		Totals
	A	B	C	D	Unk	A	E	
Fall 1998	6	27	21	5	1	1	0	61
Spring 1999	0	9	3	0	0	0	3	15
Total	6	36	24	5	1	1	3	76
<i>1999–2000</i>								
Fall 1999	11	33	21	5	0	0	2	72
Spring 2000	2	6	2	0	0	0	10	20
Total	13	39	23	5	0	0	12	92
Fall totals	64	214	166	28	1	12	7	492
% of Harvest	86%	79%	86%	85%	100%	80%	13%	77%
Fall average	5.8	19.4	15.1	2.5	0.1	1.1	0.6	44.7
Spring totals	10	58	27	5	0	3	47	150
% of Harvest	14%	21%	14%	15%	0%	20%	87%	23%
Spring average	0.9	5.3	2.4	0.5	0.0	0.3	4.3	13.6
Grand total	74	272	193	33	1	15	54	642
Annual average	6.7	24.7	17.5	3.0	0.1	1.4	4.9	58.3

Table 2 Units 19, 21A, and 21E grizzly bear harvest by type of kill, regulatory years 1993–1994 through 1999–2000

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%) ^a	F	(%) ^a	Total
<i>1993–1994</i>													
Fall 1993	20	18	0	38	0	0	0	0	20	(53)	18	(47)	38
Spring 1994	9	1	0	10	0	0	0	0	9	(90)	1	(10)	10
Total	29	19	0	48	0	0	0	0	29	(60)	19	(40)	48
<i>1994–1995</i>													
Fall 1994	24	19	1	44	0	0	0	0	24	(56)	19	(44)	44
Spring 1995	12	3	0	15	0	0	0	0	12	(80)	3	(20)	15
Total	36	22	1	59	0	0	0	0	36	(62)	22	(38)	59
<i>1995–1996</i>													
Fall 1995	29	18	1	48	0	0	1	1	29	(62)	18	(38)	49
Spring 1996	6	4	0	10	0	0	0	0	6	(60)	4	(40)	10
Total	35	22	1	58	0	0	1	1	35	(61)	22	(39)	59
<i>1996–1997</i>													
Fall 1996	18	14	0	32	0	0	0	0	18	(56)	14	(44)	32
Spring 1997	7	9	0	16	0	0	0	0	7	(44)	9	(56)	16
Total	25	23	0	48	0	0	0	0	25	(52)	23	(48)	48
<i>1997–1998</i>													
Fall 1997	36	22	0	58	0	0	0	0	36	(62)	22	(38)	58
Spring 1998	14	2	0	16	0	0	0	0	14	(88)	2	(12)	16
Total	50	24	0	74	0	0	0	0	50	(68)	24	(32)	74
<i>1998–1999</i>													
Fall 1998	39	22	0	61	0	0	0	0	39	(64)	22	(36)	61
Spring 1999	12	3	0	15	0	0	0	0	12	(80)	3	(20)	15
Total	51	25	0	76	0	0	0	0	51	(67)	25	(33)	76
<i>1999–2000</i>													
Fall 1999	38	31	0	69	2	1	0	3	40	(56)	32	(44)	72
Spring 2000	16	4	0	20	0	0	0	0	16	(80)	4	(20)	20
Total	54	35	0	89	2	1	0	3	56	(61)	36	(39)	92
<i>1993–2000</i>													
Fall total	204	144	2	350	2	1	1	4	206	(59)	145	(41)	354
Spring total	76	26	0	102	0	0	0	0	76	(75)	26	(25)	102
Grand total	280	170	2	452	2	1	1	4	282	(62)	171	(38)	456

^a Percent of known-sex bears harvested.

Table 3 Units 19, 21A, and 21E grizzly bear successful hunter residency and effort, regulatory years 1993–1994 through 1999–2000

Regulatory year	Resident (%)	Nonresident (%)	Unk	Mean effort for successful hunters (days)	Total successful hunters
1993–1994	8 (17)	40 (83)	0	4.5	48
1994–1995	17 (29)	41 (71)	1	5.4	59
1995–1996	9 (16)	48 (84)	2	6.0	59
1996–1997	5 (10)	43 (90)	0	6.0	48
1997–1998	10 (14)	64 (86)	0	4.4	74
1998–1999	15 (20)	61 (80)	0	5.0	76
1999–2000	21 (23)	71 (77)	0	4.9	92
Totals	85 (19)	368 (81)	3	5.1	456
Averages	12	52	0.4	5.1	65

Table 4 Units 19, 21A and 21E grizzly bear harvest chronology by month, regulatory years 1993–1994 through 1999–2000

Regulatory year	Harvest chronology by month (%)						<i>n</i>
	Sep	Oct	Apr	May	Other ^a		
1993–1994	35 (73%)	3 (6%)	6 (13%)	4 (8%)	0 (0%)	48	
1994–1995	40 (68%)	4 (7%)	7 (12%)	7 (12%)	1 (1%)	59	
1995–1996	48 (82%)	0 (0%)	6 (10%)	4 (7%)	1 (1%)	59	
1996–1997	30 (63%)	2 (4%)	3 (6%)	13 (27%)	0 (0%)	48	
1997–1998	56 (75%)	2 (3%)	11 (15%)	5 (7%)	0 (0%)	74	
1998–1999	51 (67%)	10 (13%)	7 (9%)	8 (11%)	0 (0%)	76	
1999–2000	67 (73%)	4 (4%)	15 (16%)	5 (6%)	1 (1%)	92	
Totals	327 (72%)	25 (5%)	55 (12%)	46 (10%)	3 (1%)	456	
Averages	47	4	7	7	0.43	65	

^a Other: One each: Jan, Jul, and Nov. Table includes bears taken under Defense of Life or Property regulations.

Table 5 Units 19, 21A, and 21E grizzly bear harvest by transport method, regulatory years 1993–1994 through 1999–2000

Regulatory year	Harvest by transport method (%)										<i>n</i>
	Airplane	Dog Team /Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk		
1993–1994	39 (82)	2 (4)	1 (2)	0 (0)	3 (6)	1 (2)	0 (0%)	2 (4)	0 (0)	48	
1994–1995	52 (88)	2 (3)	0 (0)	0 (0)	3 (5)	0 (0)	1 (2%)	1 (2)	0 (0)	59	
1995–1996	57 (96)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0%)	0 (0)	1 (2)	59	
1996–1997	45 (94)	0 (0)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0%)	0 (0)	0 (0)	48	
1997–1998	54 (73)	0 (0)	4 (6)	6 (8)	8 (11)	0 (0)	0 (0%)	1 (1)	1 (1)	74	
1998–1999	66 (88)	1 (1)	3 (4)	2 (3)	1 (1)	1 (1)	0 (0%)	1 (1)	1 (1)	76	
1999–2000	76 (83)	0 (0)	2 (2)	2 (2)	11 (12)	0 (0)	0 (0%)	1 (1)	0 (0)	92	
Averages	56 (85)	0.7 (1)	2 (3)	1.6 (2)	4 (6)	0.3 (<1)	0.1 (<1%)	0.9 (1)	0.3 (1)	65	

BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 20A, 20B, 20C, 20F, and 25C (39,228 mi²)

GEOGRAPHIC DESCRIPTION: Central and Lower Tanana Valley, and Middle Yukon River drainages

BACKGROUND

Grizzly bears are found throughout this area, with higher densities in the mountainous portions of Units 20A and 20C. We initiated a long-term grizzly bear research project in Unit 20A in 1981 to: 1) gather baseline data on population status and reproductive biology (1981–1985; Reynolds and Hechtel 1986); 2) study the effects of high exploitation rates on grizzly bear population dynamics (1986–1991; Reynolds and Boudreau 1992; Reynolds 1993); and 3) measure recovery. During the second phase of the project, the grizzly bear population was deliberately subjected to high harvest levels ($\geq 11\%$ of the population versus $\leq 6\%$ before 1981). As a result, Reynolds (1993) documented a 20% decline in the bears (≥ 2 years old) in this area since 1981. The current phase of the study examines population recovery (Reynolds 1997). Accordingly, the Board of Game reduced season length to increase recruitment and survival of female bears.

State regulations prevent grizzly bear harvest within the Denali National Park portions of Unit 20C, resulting in low harvests in that unit. The eastern half of Unit 20B supports a moderate density of grizzly bears, and harvests are highest in that portion. Grizzly bears inhabit the remainder of the area at lower densities, resulting in low harvests.

Ballard et al. (1981) and Gasaway et al. (1992) identified grizzly bears as significant predators of moose in Units 13 and 20E, respectively. However, Gasaway et al. (1983) determined that grizzly bears played little role in the dynamics of moose within the Tanana Flats portion of Unit 20A, and Miller and Ballard (1992) were unable to detect changes in moose calf survivorship during periods when bear numbers were reduced in Unit 13. Grizzly bears probably influence moose population dynamics in parts of the study area at different times. In Unit 20A, Valkenburg (1997) identified grizzly bears as important predators of Delta caribou herd neonates.

During the 1980s, McNay (1990) noted increasing numbers of hunters and increased interest in hunting grizzly bears. Subsequently, McNay (1990) analyzed harvest and population data from

this study area to develop specific management and harvest objectives. He based harvest objectives on a sustainable harvest rate of 8% of the population ≥ 2 years of age (Miller 1990).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

All subunits

- Maintain healthy grizzly populations and the ecosystems upon which they depend.
- Provide people with an opportunity to hunt, view, and photograph grizzly bears.
- Avoid human-grizzly bear interactions that threaten human life and property.

Additionally in Unit 20A

- Provide for scientific and educational use of grizzly bears.

Additionally in Unit 20C

- Maintain a grizzly bear population within Denali National Park that is largely unaffected by human activity and is not subjected to hunting within the park.

MANAGEMENT OBJECTIVES

Unit 20A Mountains

- Decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality of no more than 3% of the adult females (≥ 6 years old) and no more than 6% of the bears ≥ 2 years old.
- Cooperate with a research project (Reynolds 1997) that has these objectives:
 - Determine the length of time necessary for recovery or stabilization of a reduced grizzly bear population following reductions in human-caused mortality rates.
 - Measure the recovery responses in the dynamics of the population, especially female population size, total population size, and production and survival of offspring.

Eastern half of Unit 20B

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 6 bears ≥ 2 years old, with an average of at least 55% males.

Unit 20C within the original boundaries of Denali National Park

- Maintain a closed season on grizzly bear hunting within the park.

Unit 20A Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C

- Manage human-caused mortality in the combined area to provide stable grizzly bear populations with a 3-year mean annual human-caused mortality of no more than 26 grizzly bears ≥ 2 years old, with an average of at least 55% males.
- Manage the 3-year mean annual human-caused grizzly bear (≥ 2 years of age) mortality from individual areas with the following harvest objectives: no more than 3 bears from Unit 20A Tanana Flats, 3 from the western half of Unit 20B, 7 from Unit 20C, 7 from Unit 20F, and 6 from Unit 25C.

METHODS

HARVEST

We used data from grizzly bear sealing certificates to obtain date and location of kill, sex, skull size, hunter residency, transportation method, commercial services used and kill type – hunter harvest, illegal kill, research mortality, defense of life or property, etc. We coded location of kill noted on the sealing certificates according to Uniform Coding Units (UCU). During sealing we collected premolars to determine age. Department staff members in Fairbanks sealed most of the grizzly bears harvested in this area.

In this report we analyzed grizzly bear harvest data by both regulatory and calendar years. Many of our objectives are age-specific. Analysis by regulatory year creates difficulties because a cohort passes through 2 age classes within a single regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000). Therefore, we analyzed data relevant to age-specific objectives by calendar year to avoid confusion regarding age-class. We based all other analyses on regulatory years.

POPULATION SIZE AND DENSITY

In June 1993, H Reynolds and R Eagan (Eagan 1995) categorized UCUs in Units 20A, 20B, 20C, 20F, and 25C into 4 grizzly bear density strata: low, medium, high, and super. The low-density stratum consisted of areas with significant human development, poorly drained soils (or permafrost) and black spruce. The medium-density stratum included upland forest and tundra habitats at elevations generally between 500 and 1500 ft. The high-density stratum consisted of upland foothills and mountainous areas similar to areas of known density in Units 20A, 20E, and 13E. The super-density stratum included habitat similar to the high-density areas, but where no harvest was permitted.

The total area within each stratum excluded glaciers and land above 6000 ft. Approximately 500 mi² (1300 km²) was excluded from the high-density stratum, and 386 mi² (1000 km²) was excluded from the super-density stratum. Population size was estimated using extrapolations from stratum densities of low, 3–8 bears/1000 mi² (1–3 bears/1000 km²); medium, 13–26 bears/1000 mi² (5–10 bears/1000 km²); high, 36–44 bears/1000 mi² (14–17 bears/1000 km²); and super, 52–78 bears/1000 mi² (20–30 bears/1000 km²).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Unit 20A. Eagan (1995) classified the mountainous portion of Unit 20A as high density based on results from research in the central foothills (Reynolds 1993). High harvest rates intentionally resulted in reduced bear numbers in this portion of Unit 20A during phase 2 of the research. Phase 3 monitors recovery of the population. We expected the number of female adult bears to meet prereduction levels by 1998. However, numbers were still slightly low by March 2000. By March 2002, female adult bear numbers will likely reach prereduction levels (Reynolds 1999). If further data confirms this trend, we will address restoring the fall seasons during the next Board of Game cycle to a 5 September opening date.

The Tanana Flats in Unit 20A provide relatively poor grizzly bear habitat, resulting in low densities. Some grizzly bears on the Tanana Flats are probably dispersing from higher density areas, or are making temporary forays onto the flats. Eagan (1995) estimated that the flats provide habitat for 20 grizzly bears, or 6.5 bears/1000 mi² (2.5 bears/1000 km²).

Unit 20B. Eagan (1995) classified most of Unit 20B as low density because of the moderate habitat, high density of people, and good human access. Better habitat in the Sawtooth Mountains in the western portion was classified as low-density stratum because of good access and human activity. The upper Chena and Salcha Rivers rated medium density because it was better habitat and relatively inaccessible.

Unit 20C. Eagan (1995) classified the mountainous portion of Unit 20C into the super-density stratum (52–78 bears/1000 mi² [20–30 grizzly bears/1000 km²]). Although Dean (1987) estimated 88 bears/1000 mi² (34 bears/1000 km²) for a portion of this area in 1983, he surveyed the area along the Denali Park Road that includes the best habitat. Eagan (1995) assumed lower densities for the remainder of the mountainous portions of Unit 20C, based on densities Reynolds (1993) documented in Unit 20A in 1981.

Eagan (1995) classified a small portion of northwestern Unit 20C as medium density because of higher habitat quality than in the Unit 20C Tanana Flats, and the area also abuts some fair grizzly bear habitat in the upper Kuskokwim drainage. Eagan (1995) felt the remainder of Unit 20C was low density but indicated potential for slightly higher densities than other low density areas because the Unit 20C Tanana Flats have streams where salmon are available and there is relatively low hunting pressure.

Unit 20F. Although very little information exists, the Tozitna River drainage/Ray Mountains portion of Unit 20F contains relatively good grizzly bear habitat and warranted medium density classification. Eagan (1995) classified the remainder of Unit 20F as low density due to relatively poor grizzly bear habitat.

Unit 25C. The mountainous portion of Unit 25C was medium density. This is an extension of the medium density area of eastern Unit 20B and also includes the White Mountains. Although good

habitat abounds, Eagan (1995) noted that roads and trails through the area provide good human access. Hunters take grizzly bears incidental to their pursuit of caribou and moose.

All Subunits. Extrapolating from the stratification above, Eagan (1995) estimated that 446–782 grizzly bears (all ages) inhabit the area. Using the midpoint of the population estimate (614 bears), the combined density for the area is about 16.1 bears/1000 mi² (6.2 grizzly bears/1000 km²).

Population Composition

Reynolds (1993) summarized composition data for his study area in Unit 20A. In 1992, there were more females than males present in adult age classes, and approximately equal numbers of males and females in the subadult age classes. Because the sex ratio of grizzly bears at birth typically approximates 50:50 and hunters generally prefer to shoot the larger, adult males, and because females with cubs <2 years of age are legally protected, we suspect the 1992 composition data is currently applicable.

Distribution and Movements

Reynolds (1997) described movement and dispersal trends for the Unit 20A study area. Females exhibited high fidelity to home ranges and little emigration or immigration (Reynolds 1993).

MORTALITY

Harvest

Season and Bag Limit. In RY90 through RY93, the season for grizzly bears was 1 September–31 May with a bag limit of 1 bear every 4 regulatory years. Cubs (≤ 2 years of age) and sows accompanied by cubs were illegal to harvest. Commensurate with research objectives, the Board of Game shortened the Unit 20A season by 9 days in RY94 to 10 September–31 May. All other areas covered in this report retained the 1 September opening. There have been no changes to seasons or bag limits since RY94. These seasons and bag limits applied to both resident and nonresident hunters.

Harvest by Hunters. Recent harvest in Units 20A, 20B, 20C, 20F, and 25C seems relatively stable (Tables 1a–e). Hunters killed 23 bears in all units during RY98 and 30 during RY99. Other human-caused mortality (defense of life or property kills, illegal kills, etc.) resulted in 3 bear deaths in RY98 and 3 deaths in RY99.

Harvest Zones.

Unit 20A Mountains — Harvest included 10, 16, and 11 bears (all ages) during calendar years 1998, 1999 and 2000, respectively (Table 2). We estimate the 3-year (1998–2000) average annual harvest rate (12.0 bears) was approximately 10% of bears ≥ 2 years old, assuming Eagan's (1995) population estimates and Reynolds' (1993) population structure. Age data for female grizzlies that died from human causes were limited. Consequently, we were not able to determine if we met objectives associated with age structure for female grizzlies that died from human causes. Average annual proportion of males in the harvest in Unit 20A for RY98–RY99 was 74% ($n = 27$).

Eastern half of Unit 20B — The 3-year (calendar years 1998–2000) mean annual mortality of 7 bears ≥ 2 years of age did not meet our objective for a mean of up to 6 bears/year (Table 2). This overharvest appeared to be the result of a single event (i.e., 10 bears harvested in 2000), rather than an increasing trend in harvest. Average annual proportion of males in the Unit 20B harvest during RY98–RY99 was 72% ($n = 18$), which met our harvest composition objective of at least 55%.

Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C — In the combined area, our harvest objective of no more than 26 bears ≥ 2 years of age was met. The 3-year (1998–2000) mean annual mortality of 15.3 bears ≥ 2 years of age was only 59% of our maximum harvest objective (Table 2). Average annual harvest of males in Units 20A, 20B, 20C, 20F, and 25C for RY98–RY99 was 66% ($n = 59$), which met our objective of at least 55% males.

We also met our 3-year (1998–2000) mean harvest (bears ≥ 2 years of age) objectives for the Tanana Flats in Unit 20A with a harvest of 1.7 bears, Unit 20C with 5, Unit 20F with 1, and Unit 25C with 1. However, the harvest of 5.3 bears did not meet our 3-year (1998–2000) mean harvest objective of no more than 3 bears for the western half of Unit 20B.

Hunter Residency and Success. As in previous years, Alaska residents harvested the majority (74%) of the grizzly bears during the last 3 regulatory years (Table 3).

Harvest Chronology. Hunters harvested bears primarily during the month of September (Table 4), probably because moose and caribou hunters take many bears incidentally during that period.

Transport Methods. The methods of transportation used by successful grizzly bear hunters have not changed substantially in recent years (Table 5). One notable exception was the uncharacteristic changes in the use of airplanes, highway vehicles, and other ORVs during RY98.

CONCLUSIONS AND RECOMMENDATIONS

We did not meet the harvest objective of a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥ 2 years old in Unit 20A mountains, even with the short season. However, the population estimates used to calculate the percent harvested was from 1992 census data and the population structure may have changed since that time. Since the recovery phase of the long-term grizzly bear research project is at or near completion, we will initiate a proposal in 2002 to return the Unit 20A season start date to 5 September as originally proposed to local advisory committees. However, we must thoroughly investigate and communicate to the public the probability that returning to an earlier September season opening may decrease bear populations. Areas with high harvest density, such as the Ferry Trail Management Area and the Yanert River drainage, warrant the most careful consideration.

In addition, we did not meet our harvest objective of a 3-year mean harvest in both the eastern and western portions of Unit 20B. Although an increasing trend in harvest was not apparent, we must continue to closely monitor the kill within these harvest zones.

Finally, we must continue to closely monitor harvests, particularly in harvest zones with small harvest quotas, and to encourage the harvest of males over females. Through the next Board of Game meeting in March 2002, we plan to address these issues and our Unit 20A objectives with local advisory committees, research staff, and the Board of Game.

Grizzly bear research in Unit 20A is nearing completion and future studies are uncertain at this time. As a result, data regarding the sex and age composition of this population will no longer be available. Therefore, I recommend changing the management objectives for Unit 20A mountains to reflect this change. Because these changes subsequently affect management objectives in the other harvest zones, I also recommend modifying management objectives there by restructuring percent males in the harvest to align with subunits. Recommended management objectives for the next reporting period are as follows:

MANAGEMENT OBJECTIVES

Unit 20A Mountains

- Decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality no more than 6% of the bears ≥ 2 years old.

Eastern half of Unit 20B

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 6 bears ≥ 2 years old.

Unit 20C within the original boundaries of Denali National Park

- Maintain a closed season on grizzly bear hunting.

Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C

- Manage human-caused mortality in the combined area to provide stable grizzly bear populations with a 3-year mean annual human-caused mortality of no more than 26 grizzly bears ≥ 2 years old.
- Manage the 3-year mean annual human-caused grizzly bear (≥ 2 years of age) mortality from individual areas with the following harvest objectives: no more than 3 bears from Unit 20A Tanana Flats, 3 from the western half of Unit 20B, 7 from Unit 20C, 7 from Unit 20F, and 6 from Unit 25C.

All subunits

- Manage for a 3-year mean annual human-caused mortality of at least 55% males.

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Table 1a Unit 20A grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory year	Reported hunter kill ^a				Nonhunting kill ^b			Total estimated kill ^c				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>1995–1996</i>												
Fall 1995	6	3	0	9	0	0	0	6	3	0	9	
Spring 1996	0	2	0	2	0	0	0	0	2	0	2	
Total	6	5	0	11	0	0	0	6	5	0	11	55
<i>1996–1997</i>												
Fall 1996	4	4	0	8	0	2	0	4	6	0	10	
Spring 1997	1	2	0	3	0	0	0	1	2	0	3	
Total	5	6	0	11	0	2	0	5	8	0	13	38
<i>1997–1998</i>												
Fall 1997	6	4	0	10	0	2	0	6	6	0	12	
Spring 1998	4	0	0	4	1	0	0	5	0	0	5	
Total	10	4	0	14	1	2	0	11	6	0	17	65
<i>1998–1999</i>												
Fall 1998	3	2	0	5	0	0	0	3	2	0	5	
Spring 1999	4	0	0	4	1	0	0	5	0	0	5	
Total	7	2	0	9	1	0	0	8	2	0	10	80
<i>1999–2000</i>												
Fall 1999	10	4	0	14	1	1	0	11	5	0	16	
Spring 2000	1	0	0	1	0	0	0	1	0	0	1	
Total	11	4	0	15	1	1	0	12	5	0	17	71

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

Table 1b Unit 20B grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory year	Reported hunter kill ^a				Nonhunting kill ^b			Total estimated kill ^c				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>1995–1996</i>												
Fall 1995	1	3	0	4	0	0	0	1	3	0	4	
Spring 1996	0	0	0	0	0	0	0	0	0	0	0	
Total	1	3	0	4	0	0	0	1	3	0	4	25
<i>1996–1997</i>												
Fall 1996	4	4	0	8	0	0	0	4	4	0	8	
Spring 1997	1	0	0	1	0	0	0	1	0	0	1	
Total	5	4	0	9	0	0	0	5	4	0	9	56
<i>1997–1998</i>												
Fall 1997	2	1	0	3	0	0	0	2	1	0	3	
Spring 1998	0	2	0	2	0	3	0	0	5	0	5	
Total	2	3	0	5	0	3	0	2	6	0	8	25
<i>1998–1999</i>												
Fall 1998	8	0	0	8	1	1	0	9	1	0	10	
Spring 1999	1	0	0	1	0	0	0	1	0	0	1	
Total	9	0	0	9	1	1	0	10	1	0	11	91
<i>1999–2000</i>												
Fall 1999	2	3	0	5	0	0	0	2	3	0	5	
Spring 2000	1	1	0	2	0	0	0	1	1	0	2	
Total	3	4	0	7	0	0	0	3	4	0	7	43

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

Table 1c Unit 20C grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory year	Reported hunter kill ^a				Nonhunting kill ^b			Total estimated kill ^c				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>1995–1996</i>												
Fall 1995	0	0	0	0	0	0	0	0	0	0	0	
Spring 1996	2	0	0	2	0	0	0	2	0	0	2	
Total	2	0	0	2	0	0	0	2	0	0	2	100
<i>1996–1997</i>												
Fall 1996	3	2	1	6	0	0	0	3	2	1	6	
Spring 1997	2	1	0	3	0	0	0	2	1	0	3	
Total	5	3	1	9	0	0	0	5	3	1	9	
<i>1997–1998</i>												
Fall 1997	4	0	0	4	0	0	0	4	0	0	4	
Spring 1998	1	0	0	1	0	0	0	1	0	0	1	
Total	5	0	0	5	0	0	0	5	0	0	5	100
<i>1998–1999</i>												
Fall 1998	2	1	0	3	0	0	0	2	1	0	3	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	2	1	0	3	0	0	0	2	1	0	3	67
<i>1999–2000</i>												
Fall 1999	2	4	0	6	0	1	0	2	5	0	7	
Spring 2000	0	0	0	0	0	0	0	0	0	0	0	
Total	2	4	0	6	0	1	0	2	5	0	7	29

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

Table 1d Unit 20F grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory year	Reported hunter kill ^a				Nonhunting kill ^b			Total estimated kill ^c				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
<i>1995–1996</i>												
Fall 1995	0	0	0	0	0	0	0	0	0	0	0	
Spring 1996	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0
<i>1996–1997</i>												
Fall 1996	2	1	0	3	0	0	0	2	1	0	3	
Spring 1997	0	0	0	0	0	0	0	0	0	0	0	
Total	2	1	0	3	0	0	0	2	1	0	3	67
<i>1997–1998</i>												
Fall 1997	1	0	0	1	0	0	0	1	0	0	1	
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
<i>1998–1999</i>												
Fall 1998	1	0	0	1	0	0	0	1	0	0	1	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
<i>1999–2000</i>												
Fall 1999	0	1	0	1	0	0	0	0	1	0	1	
Spring 2000	0	0	0	0	0	0	0	0	0	0	0	
Total	0	1	0	1	0	0	0	0	1	0	1	0

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

Table 1e Unit 25C grizzly bear mortality, regulatory years 1995–1996 through 1999–2000

Regulatory year	Reported hunter kill ^a				Nonhunting kill ^b			Total estimated kill ^c					% Males
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total		
<i>1995–1996</i>													
Fall 1995	2	0	0	2	0	0	0	2	0	0	2		
Spring 1996	0	0	0	0	0	0	0	0	0	0	0		
Total	2	0	0	2	0	0	0	2	0	0	2		100
<i>1996–1997</i>													
Fall 1996	1	2	0	3	0	0	0	1	2	0	3		
Spring 1997	0	0	0	0	0	0	0	0	0	0	0		
Total	1	2	0	3	0	0	0	1	2	0	3		33
<i>1997–1998</i>													
Fall 1997	1	0	0	1	0	0	0	1	0	0	1		
Spring 1998	0	0	0	0	0	0	0	0	0	0	0		
Total	1	0	0	1	0	0	0	1	0	0	1		100
<i>1998–1999</i>													
Fall 1998	0	1	0	1	0	0	0	0	1	0	1		
Spring 1999	0	0	0	0	0	0	0	0	0	0	0		
Total	0	1	0	1	0	0	0	0	1	0	1		0
<i>1999–2000</i>													
Fall 1999	0	0	0	0	0	0	0	0	0	0	0		
Spring 2000	1	0	0	1	0	0	0	1	0	0	1		
Total	1	0	0	1	0	0	0	1	0	0	1		100

^a Includes illegal kills.^b Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.^c Percentage includes only bears of known sex.

Table 2 Unit 20A, 20B, 20C, 20F, and 25C grizzly bear harvest in 3 zones, calendar years 1995 through 2000

Harvest zone	Area (mi ²)	Calendar year	Bears killed		3-year mean harvest		Harvest density ^c
			All ages ^a	≥2 years ^b	All ages	≥2 years ^b	
Unit 20A mountains	3081 ^d	1995	11 (1)	11	11.3	11.3	3.6
		1996	9 (1)	7	9.6	9.0	2.3
		1997	13 (2)	13	11.0	10.3	4.2
		1998	10 (1)	9	10.7	9.7	2.9
		1999	16 (1)	16	13.0	12.7	5.2
		2000	11 (1)	11	12.3	12.0	3.6
Eastern half of Unit 20B	4929	1995	7	5	3.7	3.0	1.0
		1996	10 (2)	10	6.3	5.7	2.0
		1997	3	1	6.7	5.3	0.2
		1998	7 (2)	7	6.7	6.0	1.4
		1999	4	4	6.7	4.0	0.8
		2000	10	10	7.0	7.0	2.0
Unit 20A Flats, Western half of Unit 20B, Unit 20C Outside Denali National Park, Units 20F and 25C	26,278 ^e	1995	6	6	11.0	11.0	0.2
		1996	18 (2)	18	15.0	15.0	0.7
		1997	12	12	12.0	12.0	0.5
		1998	14 (3)	14	14.7	14.7	0.5
		1999	13 (1)	12	9.7	9.3	0.5
		2000	22 (2)	20	16.3	15.3	0.8

^a Parentheses indicate how many of these bears were killed by other than hunter harvest (i.e., defense of life or property, illegal kills, research activities).

^b Assuming all bears of unknown age were ≥2 years old.

^c Bears ≥2 years old harvested per 1000 mi².

^d Excludes about 500 mi² (1300 km²) of non-bear habitat in glaciers and above 6000 ft (1850 m).

^e Excludes 4450 mi² (11,500 km²) that is closed to hunting in Denali National Park.

Table 3 Unit 20A, 20B, 20C, 20F, and 25C grizzly bear successful hunter residency^a, regulatory years 1995–1996 through 1999–2000

Regulatory year	Alaska residents (%)	Nonresident (%)	Unknown (%)	<i>n</i>
1995–1996	12 (63)	6 (32)	1 (5)	19
1996–1997	23 (66)	9 (26)	3 (9)	35
1997–1998	18 (69)	8 (31)	0 (0)	26
1998–1999	20 (87)	3 (13)	0 (0)	23
1999–2000	20 (67)	9 (30)	1 (3)	30

^a Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality bears.

Table 4 Unit 20A, 20B, 20C, 20F, and 25C grizzly bear harvest chronology percent by month, regulatory years 1995–1996 through 1999–2000

Regulatory year	Percent of harvest ^a								<i>n</i>
	Sep		Total	Oct	Apr	May		Total	
	1–15	16–30				1–15	16–31		
1995–1996	37	37	74	5	5	16	5	21	19
1996–1997	43	34	77	3	0	9	11	23	35
1997–1998	31	42	73	0	0	8	19	27	26
1998–1999	61	17	78	0	0	4	17	21	23
1999–2000	40	43	83	3	0	3	10	13	30

^a Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

Table 5 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest percent by transport method, regulatory years 1995–1996 through 1999–2000

Regulatory year	Percent of harvest by transport method ^a								<i>n</i>
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	Other ORV	Highway vehicle	Other/Unk	
1995–1996	21	26	21	21	0	5	5	0	19
1996–1997	29	11	20	20	0	0	14	6	35
1997–1998	23	15	8	31	0	4	8	12	26
1998–1999	4	17	13	22	0	17	13	13	23
1999–2000	30	10	10	27	0	10	3	10	30

^a Does not include defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

SPECIES
MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 25526
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 20D (5637 mi²)

GEOGRAPHIC DESCRIPTION: Central Tanana Valley near Delta

BACKGROUND

Brown bears are distributed throughout Unit 20D; however, the Tanana River separates brown bear habitat into 2 distinct types within the unit. Unit 20D south of the Tanana River is adjacent and similar to habitat described by Reynolds (1990) for the foothills and mountains of the northcentral Alaska Range. Brown bear habitat in Unit 20D north of the Tanana River is adjacent and similar to habitat described in Unit 20E by Gasaway et al. (1990) for the hills north of the Tanana River. Hunter access to southern Unit 20D is excellent, while hunter access is more difficult in northern Unit 20D.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- As directed by the Board of Game, manage grizzly bears to reduce the effects of predation on ungulate species in portions of Unit 20D.

MANAGEMENT OBJECTIVE

- Manage for an annual mortality of 5–15 bears/year.

METHODS

Successful hunters were required to have brown bears sealed at department offices. Data collected from each brown bear included sex, skull length and width, transportation used by the hunter, number of days hunted, date and location of kill, and hunter name and address. A premolar tooth was extracted from each bear skull for use in age determination. Bears that died from nonhunting mortality sources, such as defense of life or property (DLP) killings, were also sealed. Data were summarized by regulatory year (RY = 1 Jul through 30 Jun; e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

I calculated brown bear population estimates for Unit 20D in May 1993. The Unit 20D estimate was 181–210 total bears, with 143–176 bears ≥ 2 years old. For the population estimate, I calculated separate estimates for Unit 20D north and south of the Tanana River as described below. I continued to use the 1993 estimates during this reporting period.

Southern Unit 20D. The population estimate for southern Unit 20D was 51–58 brown bears ≥ 2 years old and a total of 76–86 bears. This estimate was based on density estimates of 25.4–29.0 bears ≥ 2 years old/1000 mi², plus an additional 14% for cubs and yearlings, developed by Reynolds (1993) for similar habitat in the Alaska Range in Unit 20A.

Anecdotal information for southern Unit 20D from local residents, hunters, and pilots indicate that bears are common in most of the area. Residents commonly report bears near town, the landfill, and in the Delta Agricultural Project. Dall sheep hunters, moose hunters, and caribou hunters commonly report seeing bears in the foothills of the Alaska Range.

Northern Unit 20D. The population estimate for northern Unit 20D was 92–109 brown bears ≥ 2 years old and 105–124 total bears. This estimate was based on Gasaway et al.'s (1990) brown bear density estimates for Unit 20E of 26.9–32.1 bears ≥ 2 years old/1000 mi², plus an additional 14% for cubs and yearlings.

Reynolds (personal communication) plans to refine Alaska Range brown bear density estimates upon which we based the population estimate for southern Unit 20D. He also plans to complete a population model that calculates sustainable harvest levels based on harvest of females, rather than the current model that uses total adult harvest as the basis for estimating harvest goals. When this information is available, the Unit 20D population estimate and management objectives should be reviewed and reevaluated.

Population Composition

Brown bear population composition is unknown for Unit 20D. Because cubs or females accompanied by cubs are illegal to harvest, the sex ratio of the harvest was not used to estimate population composition.

Distribution and Movements

Brown bears are distributed throughout Unit 20D; however, no specific information on patterns of brown bear distribution or movements is available.

MORTALITY

Season and Bag Limit. During RY98 and RY99 those portions of Unit 20D south of the Tanana River and east of the east bank of the Gerstle River, or north of the Tanana River, had a 10 August–30 June hunting season for residents and nonresidents. There was also a bag limit of 1

bear/year, and no \$25 tag was required of residents. Hunters taking bears in this area were required to have the bears sealed in Delta Junction or Tok.

The hunting season south of the Tanana River and west of the Gerstle River for residents and nonresidents was 1 September–31 May. The bag limit was 1 bear/4 regulatory years and a \$25 tag was required of resident hunters.

Board of Game Actions and Emergency Orders.

RY98 and RY99 — For both periods the Alaska Board of Game, reauthorized the brown bear tag fee exemption for those portions of Unit 20D south of the Tanana River and east of the east bank of the Gerstle River.

Hunter Harvest and Other Mortality.

RY98 — Hunters killed 12 bears (Table 1) and met the harvest objective. Three bears were killed because they were nuisance bears, but sealed as hunter kills. Hunter take consisted of 83% males. All 12 bears were killed south of the Tanana River in southern Unit 20D. Hunters killed 10 bears, including all 3 nuisance bears, west of the Gerstle River where hunting regulations were most restrictive. Two bears were killed east of the Gerstle River where regulations were least restrictive.

Four bears were also killed in nonhunting circumstances (Table 1). Two bears were killed in defense of life or property (DLP) in southern Unit 20D west of the Gerstle River; another was killed illegally in the same area when it was mistaken for a black bear. One DLP bear was killed in northern Unit 20D.

The total reported mortality of 16 bears was composed of 75% males (Table 1). In addition to those killed in nonhunting circumstances (above), 3 bears were killed by hunters because the bears were considered nuisances. Most mortality (13 bears) occurred in southern Unit 20D, west of the Gerstle River where hunting regulations are most restrictive (Table 2). Two bears were killed in southern Unit 20D east of the Gerstle River and only 1 bear was killed north of the Tanana River. Total reported mortality was an estimated 8–9% of the unitwide brown bear population and 9–11% of bears ≥ 2 years old.

An estimated 1 bear is killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 17 bears (Table 1).

RY99 — All reported mortality resulted from hunter harvest. Hunters killed 11 bears (Table 1) and met the harvest objective. Four of the kills were nuisance bears that were sealed by people with a hunting license. Harvest was composed of 64% male bears. Hunters killed 6 bears in southern Unit 20D with 3 taken west of the Gerstle River in the area with most restrictive hunting regulations, and 3 taken east of the Gerstle River in the area with least restrictive hunting regulations (Table 2). Five bears were killed north of the Tanana River in northern Unit 20D, also in the area with least restrictive hunting regulations. Of those bears that were killed as nuisance bears, 2 were taken east of the Gerstle River, 1 was taken west of the Gerstle River, and 1 was killed north of the Tanana River.

An estimated 1 bear is killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 12 bears (Table 1).

Hunter Residency and Success. No significant changes occurred in previous patterns of residency of successful Unit 20D hunters during this reporting period. Most brown bears continued to be killed by residents. During RY98 and RY99, Unit 20D residents took 70% of the harvest, nonlocal residents 30%, and nonresidents did not take any bears (Table 3).

Harvest Chronology. No substantive change occurred in previous patterns of harvest chronology during this reporting period. In Unit 20D most brown bears continued to be taken during the fall hunting season. During RY98 and RY99, 65% of the bears killed by hunters were taken during August–November (Table 4).

Transport Methods. During the RY98 and RY99 reporting periods, 3- or 4-wheelers, highway vehicles, and foot access continued to be commonly used transportation types for hunting brown bears in Unit 20D (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

The harvest objective of 5–15 bears/year was met in both RY98 and RY99, and hunters took predominantly male bears. The Board of Game reauthorized brown bear tag fee exemptions in portions of Unit 20D as part of an intensive management program to increase numbers of moose and caribou.

Total bear mortality in Unit 20D has increased since the \$25 resident tag fee was eliminated in portions of Unit 20D. However, mortality of nuisance bears and nonhunting mortality continues to be a significant source of mortality.

Based on my population estimates, brown bear mortality may be at or near sustainable levels east of the Gerstle River but exceeding sustainable levels west of the Gerstle River. A significant portion of the brown bear mortality west of the Gerstle River is due to nonhunting mortality that results from people living near brown bears.

Although I estimated the brown bear population west of the Gerstle River may be experiencing mortality higher than sustainable, anecdotal observations indicate that bears remain plentiful in the area. This area will likely continue to experience high levels of bear mortality because of the number of human inhabitants. However, because this area is relatively small and surrounded by areas that have healthy brown bear populations, no reduction in the hunting regulations are planned at this time. There is significant demand for human use of moose and caribou in southern Unit 20D, and current population objectives are to increase the size of these ungulate populations. A localized reduction in the brown bear population may benefit survival of moose and caribou calves.

The Unit 20D brown bear population should be monitored closely during the next few years to determine long-term effects of liberalized hunting regulations in portions of the unit and to monitor the population west of the Gerstle River where mortality rates are highest.

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Table 1 Unit 20D brown bear mortality^a, regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill				Nonhunting kill ^a					M	F	Unk	Total
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	F	Unk	Total
<i>1989–1990</i>													
Fall 1989	2	0	0	2	0	0	0	1	0	2	0	1	3
Spring 1990	2	0	0	2	0	0	0	0	0	2	0	0	2
Total	4	0	0	4	0	0	0	1	0	4	0	1	5
<i>1990–1991</i>													
Fall 1990	3	2	0	5	0	0	0	1	0	3	2	1	6
Spring 1991	0	2	0	2	0	0	0	0	0	0	2	0	2
Total	3	4	0	7	0	0	0	1	0	3	4	1	8
<i>1991–1992</i>													
Fall 1991	0	0	0	0	0	1	0	1	0	0	1	1	2
Spring 1992	2	3	0	5	0	0	0	0	0	2	3	0	5
Total	2	3	0	5	0	1	0	1	0	2	4	1	7
<i>1992–1993</i>													
Fall 1992	4	2	0	6	1	0	0	1	0	5	2	1	8
Spring 1993	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	6	3	0	9	1	0	0	1	0	7	3	1	11
<i>1993–1994</i>													
Fall 1993	5	1	0	6	0	0	0	1	0	5	1	1	7
Spring 1994	0	1	0	1	0	0	0	0	0	0	1	0	1
Total	5	2	0	7	0	0	0	1	0	5	2	1	8
<i>1994–1995</i>													
Fall 1994	2	2	0	4	0	0	0	1	0	2	2	1	5
Spring 1995	1	1	0	2	1	0	0	0	0	2	1	0	3
Total	3	3	0	6	1	0	0	0	0	4	3	1	8
<i>1995–1996</i>													
Fall 1995	8	3	0	11	0	0	0	1	0	8	3	1	12
Spring 1996	3	2	0	5	0	0	0	0	0	3	2	0	5
Total	11	5	0	16	0	0	0	1	0	11	5	1	17
<i>1996–1997</i>													

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill				Nonhunting kill ^a			Unreported	Illegal	M	F	Unk	Total
	M	F	Unk	Total	M	F	Unk						
Fall 1996	4	2	0	6	0	3	0	1	0	4	5	1	10
Spring 1997	1	0	0	1	0	1	0	0	0	1	1	0	2
Total	5	2	0	7	0	4	0	1	0	5	6	1	12
<i>1997–1998</i>													
Fall 1997	3	3	0	6	0	0	0	1	0	3	3	1	7
Spring 1998	2	0	0	2	0	1	0	0	0	2	1	0	3
Total	5	3	0	8	0	1	0	1	0	5	4	1	10
<i>1998–1999</i>													
Fall 1998	8	1	0	9	2	2	0	1	0	10	3	1	14
Spring 1999	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	10	2	0	12	2	2	0	1	0	12	4	1	17
<i>1999–2000</i>													
Fall 1999	4	2	0	6	0	0	0	1	0	4	2	1	7
Spring 2000	3	2	0	5	0	0	0	0	0	3	2	0	5
Total	7	4	0	11	0	0	0	1	0	7	4	1	12

^a Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 2 Unit 20D brown bear mortality^a with differing hunting regulations, regulatory years 1987–1988 through 1999–2000

Regulatory year	Southern Unit 20D								Northern Unit 20D		Total Unit 20D		Total bears M+F
	West of Gerstle River		East of Gerstle River		Unk location		Total						
	M	F	M	F	M	F	M	F	M	F	M	F	
	1 bear/4 yr, 1 Sep–31 May, \$25 tag ^b												
1987–1988	2	0	4	4	1	0	7	4	0	1	7	5	12
1988–1989	1	1	1	1	0	0	2	2	2	0	4	2	6
1989–1990	2	0	0	0	0	0	2	0	2	0	4	0	4
1990–1991	1	2	2	0	0	1	3	3	0	1	3	4	7
1991–1992	<u>2</u>	<u>3</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>4</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>4</u>	<u>6</u>
Total kill	8	6	7	6	1	1	16	13	4	2	20	15	35
Kill/Year	3		3		0		6		1		7		
% Male	57		54		50		55		67		57		
	1 bear/4 yr, 1 Sep–31 May, \$25 tag ^b								1 bear/yr, 10 Aug–30 Jun, no tag fee ^b				
1992–1993	4	1	1	1	0	1	5	3	2	0	7	3	10
1993–1994	2	0	2	1	0	0	4	1	1	1	5	2	7
1994–1995	<u>3</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>4</u>	<u>3</u>	<u>0</u>	<u>0</u>	<u>4</u>	<u>3</u>	<u>7</u>
Total kill	9	3	4	3	0	1	13	7	3	1	16	8	24
Kill/Year	4		2		0		7		1		8		
% Male	75		57		0		65		67		67		
	1 bear/4 yr, 1 Sep–31 May, \$25 tag ^b		1 bear/yr, 10 Aug–30 Jun, no tag fee ^b						1 bear/yr, 10 Aug–30 Jun, no tag fee ^b				
1995–1996	4	1	3	1	0	0	7	2	4	3	11	5	16
1996–1997	3	4	1	1	0	0	4	5	1	1	5	6	11
1997–1998	3	3	0	1	0	0	3	4	2	1	5	4	10
1998–1999	10	3	2	0	0	0	12	3	0	1	12	4	16
1999–2000	<u>1</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>7</u>	<u>4</u>	<u>11</u>
Total kill	21	13	8	4	0	0	29	17	11	7	40	24	64
Kill/Year	7		2		0		9		4		13		
% Male	62		67		0		63		61		63		

^a Includes nonhunting mortality.^b Hunting regulation.

Table 3 Unit 20D residency of successful brown bear hunters, regulatory years 1989–1990 through 1999–2000

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Unk	Total successful hunters
1989–1990	3	1	0	0	4
1990–1991	4	2	0	1	7
1991–1992	3	0	0	0	3
1992–1993	6	4	0	0	10
1993–1994	3	4	0	0	7
1994–1995	2	4	0	0	6
1995–1996	7	6	1	2	16
1996–1997	5	2	0	0	7
1997–1998	5	2	1	0	8
1998–1999	7	5	0	0	12
1999–2000	9	2	0	0	11

^a Residents of Unit 20D.

Table 4 Unit 20D chronology of brown bear harvest by month, regulatory years 1989–1990 through 1999–2000

Regulatory year	Harvest by month								<i>n</i>
	Aug	Sep	Oct	Nov	Apr	May	Jun	Other	
1989–1990	0	2	0	0	0	2	0	0	4
1990–1991	0	5	0	0	0	2	0	0	7
1991–1992	0	1	0	0	0	4	1	0	6
1992–1993	0	4	2	0	0	3	0	1	10
1993–1994	1	4	0	1	0	1	0	0	7
1994–1995	0	4	0	0	0	2	0	0	6
1995–1996	1	9	1	0	0	2	3	0	16
1996–1997	1	4	1	0	0	1	0	0	7
1997–1998	0	5	1	0	0	2	0	0	8
1998–1999	0	7	0	2	0	3	0	0	12
1999–2000	1	3	2	0	0	2	3	0	11
Total	4	48	7	3	0	24	7	1	94
Percent	4%	51%	7%	3%	0%	26%	7%	1%	

Table 5 Unit 20D percent of brown bear harvest by transport method, regulatory years 1989–1990 through 1999–2000

Regulatory year	Percent harvest by transport method										<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Other	Unk	
1989–1990	0	0	25	0	0	25	25	25		0	4
1990–1991	0	14	0	0	0	57	14	14		0	7
1991–1992	0	0	0	0	17	17	0	67		0	6
1992–1993	10	10	20	20	0	0	30	10		0	10
1993–1994	14	0	29	0	0	0	43	14		0	7
1994–1995	17	17	0	33	0	0	17	17		0	6
1995–1996	25	0	13	25	0	0	31	6		0	16
1996–1997	0	0	29	14	0	14	43	0		0	7
1997–1998	13	0	13	25	0	13	13	0	25	0	8
1998–1999	0	0	0	58	0	0	8	33	0	0	12
1999–2000	9	0	9	0	0	9	27	46	0	0	11

BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 20E (11,000 mi²)

GEOGRAPHIC DESCRIPTION: Fortymile, Charley, and Ladue River drainages, including the Tanana Uplands and all drainages into the south bank of the Yukon River upstream from and including the Charley River drainage

BACKGROUND

The grizzly bear population in Unit 20E declined to low levels during the 1950s as a result of an intensive, year-round federal predator control program. After the program ended, bears were lightly exploited throughout the 1960s and 1970s. While no studies specifically addressed this question in Unit 20E, it is reasonable to assume that the population recovered to about 54 bears/1000mi² (21 bears/1000 km²) based on estimated grizzly bear densities in areas with comparable habitats (Reynolds 1997). There are no salmon spawning streams in Unit 20E and the natural density of bears is lower than areas with salmon.

During the early 1980s, moose densities in Unit 20E were low (0.2 moose/mi², 0.5 moose/km²) and predation by grizzly bears was a major factor in limiting this population (Gasaway et al. 1992). In an attempt to reduce the grizzly bear population, hunting regulations were liberalized. Our objective was to reduce the grizzly population through increased harvest to a level that resulted in a substantial decline in bear predation on calf moose. Regulation changes included: lengthening the season; increasing the bag limit from 1 bear/4 years to 1 bear/year; and between 1984 and 1992, revoking the \$25 resident tag fee requirement. Annual grizzly bear harvests increased from a mean of 3 during regulatory years 1966 through 1981 to a mean of 19 during regulatory years 1982 through 1988 (i.e. regulatory year 1988 went from July 1, 1988 to June 30 1989). Based on the combination of harvest rate, harvest sex ratio, and average age of the harvested bears, it is reasonable to assume that harvest resulted in reduction in the grizzly bear population in a portion of Unit 20E. Further support for this line of reasoning is that the Unit 20E grizzly bear population was estimated at 31–41 bears/1000 mi² (12–16 bears/1000 km²; Boertje et al. 1987) by the mid-1980s.

Survival of moose calves to 5 months of age in Unit 20E increased between 1982 and 1990, during the period of liberalized bear seasons. We believed this increased calf survival was related to a reduction in predator:prey ratios because moose numbers slowly increased in areas

where bear numbers were decreasing. This interpretation has led to liberalized grizzly bear harvest regulations in other areas even though in many cases there have been no field studies designed to evaluate how moose and caribou calf survival is impacted by the increased harvest of bears and the reduction in the bear population.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Provide maximum opportunity to hunt grizzly bears in Unit 20E.

MANAGEMENT OBJECTIVES

- Manage for temporary reductions in the grizzly bear population or to reduce bear predation where it may be limiting moose population growth (e.g., moose populations are below food-limiting densities with fall calf:cow ratios <25:100).
- After moose populations increase to desired levels, reduce bear harvests to allow for bear population stabilization or recovery.

When developing grizzly bear and wolf management goals for Unit 20E, I also considered the management goals and objectives of the area's moose and caribou populations. Area moose populations are currently limited by predation and grizzly bears are the primary predator on newborn moose calves (Gasaway et al. 1992). Grizzly bears are also an important predator on newborn caribou calves (Boertje and Gardner 1999). The need for combining predator and ungulate population and harvest objectives in Unit 20E has become more apparent after the Board of Game designated the moose population in most of Unit 20E and the Fortymile caribou herd as important for high levels of human consumptive use. Under the intensive management law the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because a population is depleted or has reduced productivity. In Unit 20E, intensive management includes reduction of predation on moose and caribou by bears and wolves. In the future, the intensive management law may be the justification behind Unit 20E's population and harvest management.

METHODS

Grizzly bears harvested in Unit 20E must be sealed within the unit or at Tok before being transported out of the area. During the sealing process, we determine the sex of the bear, measure the length and width of the skull, extract a premolar tooth, and collect information on date and location of harvest and time spent afield by the hunter. Premolar teeth were sent to Matson's Laboratory (Milltown, Montana USA) for age determination. Harvest data were summarized by regulatory year.

In summer 2000 we established 3 permanent sampling areas to assess annual berry abundance in Unit 20E and 5 sampling areas in Unit 12. Each area has 5 1-m² plots. Sample areas and individual plots were not selected randomly but by the presence of blueberry plants. We selected for a variety of habitat types, aspects, elevations, and slopes. We will monitor annual rainfall and seasonal temperatures at each site to assess variability of blossom and berry production. To

measure berry production, we will count the number of berries within each plot at the same time each year. Over time, we hope to compare berry production between years and sites to evaluate the relationships between berry abundance, bear harvest, and the number of problem bear incidents.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

I estimated that the autumn 2000 Unit 20E population was 475–550 bears (17.1–19.8 bears of all ages/1000 km², 44.3–51.3/1000 mi²) and that the population trend was stable. My estimate was based on radiotelemetry data collected by Boertje et al. (1987), Unit 20E harvest statistics collected since 1977, and bear harvest and population trend data collected from an intensively hunted grizzly bear population in the central Alaska Range (Reynolds and Boudreau 1992).

Reynolds and Boudreau (1992) found that a 6% mortality rate of adult females ≥6 years old would result in a grizzly bear population decline. In addition, Reynolds (1990) reported that an overall harvest of 11% for 8 years resulted in a population decline of 32%. Natural mortality accounted for about 2% annually and human-caused mortality included hunter kills, illegal kills, and wounding losses.

Grizzly bear hunting regulations in Unit 20E were liberalized in 1982 with the intent of reducing the bear population. Since 1982, annual harvests were within sustainable levels in Unit 20E as a whole. However during the 1980s and early 1990s, in that portion of Unit 20E that includes the Dennison, Middle, West, and Mosquito Forks of the Fortymile River and the upper Charley River drainages (3670 mi²; 9500 km²), the harvest rate was 6–9% of the estimated population, including harvest rates of 8–20% of the female bears >5 years old.

Using Reynolds and Boudreau (1992) sustainable mortality rates for females and all bears, I estimated that grizzly bear numbers within this area declined by 2% annually between 1982 and 1988. The population probably remained stable during 1989 through 1991 but declined by 2% annually between 1992 and 1996, again due to high harvest rates (harvest density = 8.3/10,000 mi²; 3.2/10,000 km²). During RY97 through RY99, the population was probably stable. In the remainder of Unit 20E (about 7000 mi²; 18,000 km²), harvest remained low (harvest density = 0.44/10,000 mi² or 0.17/10,000 km²) and had little effect on population trend.

Taken independently, specific harvest statistics indicate that the Unit 20E bear population initially declined as a result of increased harvest. Kill rate data and relationship of percent males in the harvest to age class (Fraser et al. 1982) indicated that the bear population in the high harvest area was heavily harvested following the change in regulations ($t = 0.001$). Average male skull size during the period of increased harvest was significantly smaller compared to the 5 regulatory years before the increase ($t = 0.0003$; Table 1), and the trend showed an increased presence of younger males ($P = 0.059$). These trends indicate that as large males were harvested, increased immigration of young males probably occurred. In contrast, skull size and age of harvested females did not change between the 2 periods. It is unlikely that increased presence of young males in the harvest was due to increases in recruitment of young males because there was no evidence of increased recruitment of young females. These data indicate that liberalizing harvest regulations and initiating a public awareness campaign can cause the population to

decline, primarily by reducing the number of resident males and by changing the composition to a population more dominated by young males.

During the report period, harvest was 12 in RY98 and 5 bears in RY99. Harvest was distributed throughout the unit. Harvest totals were below sustainable levels and were estimated to have no effect on population trend. The preliminary RY00 harvest was 19 bears, 10 of which were males (53%). Factors causing this higher than expected harvest are unknown but an increased grizzly bear harvest also occurred in adjacent Unit 12.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 20E, 1 bear every regulatory year	10 Aug–30 Jun (General hunt only)	10 Aug–30 Jun

A bear taken in this unit did not count against the bag limit of 1 bear every 4 years in other units; however, no person could take more than 1 bear, statewide, per regulatory year. During the report period a \$25 resident tag fee was required to hunt grizzly bears in Unit 20E.

Board of Game Actions and Emergency Orders. No regulatory changes for grizzly bears in Unit 20E occurred during the report period. During spring 1998, the Board of Game decided against a resident tag fee exemption in Unit 20E and against reducing the bag limit to 1 bear every 4 regulatory years. Since 1996 the board has waived the grizzly bear tag fee in northern Unit 20D in an attempt to increase harvest; this action may affect the grizzly bear population in adjacent portions of Unit 20E. Based on harvest distribution in Unit 20D, this regulatory change has had little effect on Unit 12 grizzly bears (DuBois, personal communication).

During spring 1998 the Board of Game designated the moose population in portions of Unit 20E and the Fortymile caribou herd as important for high levels of human consumptive use under the intensive management law. These designations mean the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because either of these moose or caribou populations become depleted or have reduced productivity. This decision may affect the Unit 20E grizzly bear population in the future if further brown bear population reduction is deemed appropriate to meet the population goals of moose and caribou. Since 1992 the Upper Tanana/Fortymile and Eagle advisory committees have wanted to eliminate the tag fee requirement in Unit 20E to increase bear harvest in the more heavily hunted areas. Both committees believe that because moose in most of Unit 20E and the Fortymile caribou herd are to be intensively managed, additional grizzly bear hunting opportunity is valid.

They plan to submit a proposal to waive the tag fee requirement during the 2002 Board of Game meeting.

During spring 2000 the Board of Game substantially liberalized the Fortymile caribou bag limit across the herd's range. This regulation will become effective in autumn 2001. Grizzly bears are often killed opportunistically by caribou and moose hunters. Therefore, increased caribou hunting opportunity may also increase grizzly bear harvest, especially in Unit 20E along the Taylor Highway and its associated trails and in Unit 25C, south and east of the Steese Highway.

Hunter Harvest. During the report period, hunters reported taking 12 bears in RY98 and 5 bears in RY99 (Table 2). The 5-year average harvest was 15 bears. The mean percentage of males taken in the harvest during the past 5 years in Unit 20E was 51%. During RY98 and RY99 males represented 58% and 40% of the harvest, respectively.

Grizzly bear harvests significantly increased in RY82 ($P = 0.001$) compared with harvest totals during RY77 through RY81. Harvests remained high until RY88 (average annual harvest = 18.9) in response to the more liberal seasons and bag limits. Harvests declined between RY89 and RY92 (average harvest = 12.0) even though hunting regulations remained liberal and hunting pressure increased, indicating the number of legal bears in the more accessible areas of Unit 20E may have declined, were less vulnerable to harvest, or hunter desire for a Unit 20E grizzly was reduced. The increase in harvest between RY93 and RY96 can be explained by greater hunter effort in areas that historically received little hunting pressure and supported a higher density of bears. Another factor that may have caused the grizzly bear harvest to be lower was that since RY96 fewer hunters have been afield compared to the previous 5 years due to reduced hunting opportunity for Fortymile caribou. This caused the incidental harvest of grizzly bears to decline.

Hunter Residency and Success. During the report period, resident hunters took 74% (25 bears taken by residents/34 taken by nonresidents) of the grizzly bear harvest from Unit 20E, compared with the 5-year average of 81% (Table 3). Historically, little guided hunting for grizzly bears occurred in Unit 20E. The few bears taken by nonresidents were killed while hunting moose or caribou with a second degree of kindred relative who was a state resident. Beginning in 1995 several Unit 20E guides began taking more nonresident grizzly bear hunters to remote portions of the unit. I expect grizzly bear harvest in Unit 20E by nonresidents to increase in 2001 as more area guides will be using the area since the nonresident season for Fortymile caribou will be open after a 5-year hiatus.

Harvest Chronology. During the past 12 years, 78% of grizzly bears were harvested during August and September when most moose and caribou hunters were afield (Table 4). In Unit 20E, few bears are taken in the spring.

Transport Methods. During the report period, airplanes were used by 56% (19/34) of successful grizzly bear hunters in Unit 20E (Table 5). During the previous 5 years, airplanes (39%), 3- or 4-wheelers (22%), and highway vehicles/walk (14%) were the modes of transportation used by most successful bear hunters. Use of airplanes to hunt grizzly bears in Unit 20E increased as more hunters gained access to remote areas.

Other Mortality

Two bears (1 male, 1 female) were reported taken in defense of life and property (DLP) incidents during this report period. Possible reasons for the lack of reported DLP kills in recent years were the long season (only closed during 1 Jul–9 Aug) and significantly reduced bear numbers in the vicinity of the communities in Unit 20E. Most natural grizzly bear mortality in Unit 20E is probably the result of intraspecific strife and cannibalism (Boertje et al. 1987). Reynolds (1997) estimated natural mortality at 2.5% for females ≥ 2 years of age and 1.9% for females ≥ 6 years of age.

HABITAT

Assessment

All of Unit 20E is suitable grizzly bear habitat. Few human developments exist with the exception of the Taylor Highway and the small communities of Eagle, Boundary, and Chicken. The unit offers a variety of forbs and berries for grizzly bears. However, there are no arctic ground squirrels and few opportunities for salmon, food types known to be important food sources elsewhere. Habitat diversity was affected by the high level of wildfire suppression during the 1960s and 1970s. Almost all habitat types are used by grizzly bears in the unit and average home range sizes for adult male and female bears are 1409 km² (544 mi², $s = 695$) and 391 km² (151 mi², $s = 318.3$), respectively (Boertje et al. 1987).

We established 3 blueberry sample areas in Unit 20E and 5 sample areas in Unit 12 during July 2000 (Table 6). Based on discussions with local berry pickers, hunters, and hikers, it was a poor berry year in Unit 20E but there were patches of local abundance. Based on the first year's data, blueberries were more common in the higher elevations but were patchy in distribution. Our selection of the sample areas during early July was too late to determine blossom production. Our objective is to annually monitor blossom and berry production in these areas of Units 20E and 12 and evaluate the effects of berry abundance on bear harvest and problem bear incidents.

Enhancement

The Alaska Interagency Fire Management Plan: Fortymile Area was implemented in the early 1980s and dictates that over 60% of the area will receive only limited fire suppression. This means that fires in this area will be monitored but not suppressed except under exceptionally severe fire conditions. Recurring wildfires increase habitat heterogeneity and productivity for bears and their primary prey. Under the prescribed fire burn plan for Unit 20E, about 95,000 acres burned in 3 different areas during 1998 and 1999. Two of these areas were dominated by climax spruce forest and one by decadent willow/birch/alder shrub. Based on range recovery in adjacent burns, grizzly bears will likely benefit from these fires within 10–15 years.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Research in Unit 20E and other parts of Alaska demonstrated that grizzly bear and wolf predation can be the primary limiting factor in moose and caribou population growth (Gasaway et al. 1992). They recommended altering wolf and bear predation simultaneously to achieve maximum potential for increases in moose numbers. Grizzly bear harvest regulations were

liberalized in Unit 20E in 1981 with the intent of reducing in the bear population to benefit moose. This led to a reduction in the bear population and a change in the sex and age composition in a portion of Unit 20E. Initial analyses demonstrated that survival of neonatal moose increased substantially after 8 years of increased grizzly bear harvest and an estimated 2% annual decline in the bear population (Gasaway et al. 1992). However, subsequent analysis indicated that further reductions in grizzly bear numbers did not improve moose calf survival in Unit 20E (Gardner 1999).

In portions of Unit 20E, a nonlethal wolf control program was conducted during 1997 through May 2001. Wolf numbers were reduced by 75–80% within 15 wolf territories through translocation, sterilization, and take by trappers. Six of these wolf pack territories were located in the area where grizzly bear numbers were also reduced by harvest. During 1998 through November 2000, I have conducted moose population estimation surveys within a portion of the area where wolf and grizzly bear populations have been reduced. As of November 2000, moose numbers have remained relatively stable. Moose composition data indicate that calf survival to 5 months old remained low (17–23 calves/100 cows) and yearling bull survival was high (13–18/100 cows). It appears that grizzly bear predation may still be responsible for mortalities of a high proportion of the calves, but the effect of wolf predation may be declining (Gardner, unpublished data).

I modeled current population status and trend data for moose and their predators using McNay and DeLong's (1999) pred/prey model. The application of this model using data from Unit 20E predicts that the moose population within the nonlethal wolf control area will continue to be primarily limited by grizzly bear predation on calves. Gasaway et al. (1992) estimated that between 1981 and 1988, 65% of calf mortality was due to grizzly bears. In order for the model to track current population status, grizzly bears would have had to cause 60% of the calf mortality during 1997–1999.

Assuming grizzly bear predation rates remain relatively constant during the next 5 years, the model predicts that the effect of nonlethal wolf control will be minimal on population trend (annual growth rates = 0.97–1.00), and that calf:cow ratios will be 20 to 25 calves:100 cows.

In contrast, the model predicts moose numbers would increase 8–10% annually if the number of grizzly bears or their predation efficiency were reduced. This would result in a decline in the mortality of calves from a rate of 60% to a rate of 45%. The objective for liberalizing the Unit 20E grizzly bear regulations in 1981 was to reduce the grizzly bear population through harvest. Harvest increased in portions of the unit and the bear population declined. The model output predicts that reductions in the bear population prior to wolf control may have reduced adult moose mortality but that calf mortality was not substantially reduced. Observations of the moose population and application of the model indicate that a similar number of moose calves were killed by grizzly bears both before and after the bear population reduction. This low recruitment of calves caused the moose population to remain relatively stable. If intensive management is to be effectively implemented in Unit 20E, new ideas of how to manage bear predation on calves may be necessary. It does not appear that the increase in the grizzly bear harvest under the current harvest regulations have been substantial enough to result in reductions in bear numbers.

To reduce the effects of grizzly bear predation on calves, either the number of bears would have to be reduced to a level at which predation is no longer a factor, or bear efficiency as a predator on calves would have to be reduced. My observations during calf mortality studies and moose composition data collected in areas of reduced grizzly bear numbers indicate fewer bears can kill more calves, resulting in the same overall predation rate compared to before bears were reduced. Boertje et al. (1988) reported that there were no differences in calf moose kill rates between sex and age classes of grizzly bears. These data indicate restricting harvest to males and females not accompanied by cubs may not reduce the bear population sufficiently to override the predation efficiency and compensatory abilities of the remaining bears. To reduce bear predation efficiency other methods would be necessary. Two possibilities for Unit 20E are supplementary feeding of bears or creating a situation in which bears are not as efficient as a predator. Bear predation efficiency declined in early successional habitats following wildfires (Schwartz and Franzmann 1989). Combining liberal grizzly bear harvests with habitat enhancement programs may provide a means of increasing moose calf survival until other methods of publicly acceptable bear population control are found.

CONCLUSIONS AND RECOMMENDATIONS

During fall 2000 I estimated there were 475–550 grizzly bears in Unit 20E. Harvest data indicated the population has declined only slightly since 1981 despite very liberal hunting regulations. Due to the inaccessibility of most of the unit, harvest had little impact on the total population size. However, in the central portion of Unit 20E, harvest increased significantly in RY82 and remained high until RY89. Harvest was also high between RY93 and RY96. Annual kill densities were 1.92–4.35 bears/10,000 mi² (0.74–1.68/10,000 km²). Bear numbers within this area declined by an estimated 2% annually. Since 1994, harvest has become more dispersed across the unit. Population trend is currently stable.

Grizzly bear management in Unit 20E provides maximum bear hunting opportunity, which meets our management goal. However, we did not meet our management objective to increase moose or caribou calf survival by reducing the grizzly bear population using liberalized harvest regulations.

Even though data do not indicate that harvest-caused reductions in bear populations have resulted in enhanced calf survival in Unit 20E, I recommend the current management objectives for liberalized harvest be retained. During the past 4 years, trappers and nonlethal wolf control activities have reduced the wolf population in a portion of the unit. Research and management efforts in conjunction with the Fortymile Caribou Management Plan will benefit from documenting the effects harvest has on bear predation on moose calves in the same area in which wolves were reduced.

Recommendations for future changes in the harvest regulations will depend on the effects of increased hunting pressure beginning in 2001. I am concerned that grizzly bear harvest in both Units 20E and 25C may become excessive after 2001. Thousands of hunters may be attracted to the area as Fortymile caribou seasons are liberalized, which may result in increased incidental take of bears. To ensure adequate protection to grizzly bears in the future, harvest management should be based on the combination of total harvest and numbers of females taken. Hunters

would have to be more selective while hunting grizzly bears but, if successful, could ensure high levels of hunter opportunity without jeopardizing the bear population.

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Table 1 A comparison of male skull size and harvest density in the pretreatment versus treatment periods

Test	Hypothesis ^a	Pretreatment	Treatment	<i>t</i> -test	Interpretation
Harvest density	H_o : Pre=Treat	5	16	0.0003	Harvest density > during treatment.
	H_A : Pre<Treat			0.0001	Satterthwaite correction.
Male skull size	H_o : Pre=Treat	5	16	0.0003	Male skull size > during pretreatment.
	H_A : Pre<Treat			0.0095	Satterthwaite correction.

^a Pre=Treat, pretreatment sample is not different from the treatment or intensive harvest sample; Pre<Treat, pretreatment sample is less than the treatment or intensive harvest sample.

Table 2 Unit 20E grizzly bear mortality, regulatory years 1989–1990 through autumn 2000–2001

Regulatory year	Reported							Estimated kill		Total estimated kill				Total
	Hunter kill				Nonhunting kill ^a					M (%)	F (%)	Unk		
	M	F	Unk	Total	M	F	Unk							
<i>1989–1990</i>														
Fall 1989	4	2	0	6	0	0	0	0	0	4 (67)	2 (33)	0	6	
Spring 1990	3	1	0	4	0	0	0	0	0	3 (75)	1 (25)	0	4	
Total	7	3	0	10	0	0	0	0	0	7 (70)	3 (30)	0	10	
<i>1990–1991</i>														
Fall 1990	7	3	0	10	0	0	0	0	0	7 (70)	3 (30)	0	10	
Spring 1991	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3	
Total	9	4	0	13	0	0	0	0	0	9 (69)	4 (31)	0	13	
<i>1991–1992</i>														
Fall 1991	2	4	0	6	0	0	0	0	0	2 (33)	4 (67)	0	6	
Spring 1992	3	2	0	5	0	0	0	0	0	3 (60)	2 (40)	0	5	
Total	5	6	0	11	0	0	0	0	0	5 (45)	6 (55)	0	11	
<i>1992–1993</i>														
Fall 1992	7	3	1	11	0	0	0	0	0	7 (64)	3 (27)	1	11	
Spring 1993	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3	
Total	9	4	1	14	0	0	0	0	0	9 (64)	4 (29)	1	14	
<i>1993–1994</i>														
Fall 1993	9	10	0	19	0	0	0	0	0	9 (47)	10 (53)	0	19	
Spring 1994	0	2	0	2	0	0	0	0	0	0 (0)	2 (100)	0	2	
Total	9	12	0	21	0	0	0	0	0	9 (43)	12 (57)	0	21	
<i>1994–1995</i>														
Fall 1994	6	4	0	10	0	0	0	0	2	8 (75)	4 (25)	0	12	
Spring 1995	1	0	0	1	0	0	0	0	0	1 (100)	0 (0)	0	1	
Total	7	4	0	11	0	0	0	0	2	9 (69)	4 (31)	0	13	
<i>1995–1996</i>														
Fall 1995	6	8	0	14	0	0	0	0	0	6 (43)	8 (57)	0	14	
Spring 1996	5	2	0	7	0	0	0	0	0	5 (71)	2 (29)	0	7	
Total	11	10	0	21	0	0	0	0	0	11 (52)	10 (48)	0	21	
<i>1996–1997</i>														
Fall 1996	8	10	0	18	0	0	0	0	1	9 (47)	10 (53)	0	19	
Spring 1997	2	2	0	4	0	0	0	0	0	2 (50)	2 (50)	0	4	
Total	10	12	0	22	0	0	0	0	1	11 (48)	12 (52)	0	23	
<i>1997–1998</i>														

Regulatory year	Reported							Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill ^a					M (%)	F (%)	Unk	Total
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal				
Fall 1996	7	4	0	11	0	0	0	0	1	7 (58)	4 (33)	1	12
Spring 1997	0	0	0	0	0	0	0	0	0	0 (00)	0 (00)	0	0
Total	7	4	0	11	0	0	0	0	1	7 (58)	4 (33)	1	12
1998–1999													
Fall 1998	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12
Spring 1999	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12
1999–2000													
Fall 1999	0	2	0	2	0	0	0	0	0	0 (0)	2 (100)	0	2
Spring 2000	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	2	3	0	5	0	0	0	0	0	2 (40)	3 (60)	0	5
2000–2001 ^b													
Fall 2000	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19

^a Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

^b Preliminary harvest.

Table 3 Unit 20E residency of successful grizzly bear hunters, regulatory years 1989–1990 through 2000–2001

Regulatory year	Resident (%)	Nonresident (%)	Unknown (%)	Total successful hunters
1989–1990	9 (90)	1 (10)	0 (0)	10
1990–1991	12 (92)	1 (8)	0 (0)	13
1991–1992	11 (100)	0 (0)	0 (0)	11
1992–1993	12 (86)	2 (14)	0 (0)	14
1993–1994	20 (95)	1 (5)	0 (0)	21
1994–1995	8 (73)	2 (18)	1 (9)	11
1995–1996	9 (43)	9 (43)	3 (14)	21
1996–1997	21 (91)	2 (9)	0 (0)	23
1997–1998	9 (82)	2 (18)	0 (0)	11
1998–1999	8 (73)	3 (27)	0 (0)	11
1999–2000	3 (60)	2 (40)	0 (0)	5
2000–2001 ^a	14 (78)	4 (22)	0 (0)	18

^a Preliminary harvest.

Table 4 Unit 20E chronology of brown bear harvest by month, regulatory years 1989–1990 through 2000–2001^a

Regulatory year	Harvest by month														<i>n</i>
	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Apr	(%)	May	(%)	Jun	(%)	
1989–1990	1	(10)	5	(50)	0	(0)	0	(0)	1	(10)	2	(20)	1	(10)	10
1990–1991	2	(15)	7	(54)	0	(0)	0	(0)	0	(0)	3	(23)	1	(8)	13
1991–1992	3	(27)	2	(18)	1	(9)	0	(0)	0	(0)	1	(9)	4	(36)	11
1992–1993	4	(29)	5	(36)	2	(14)	0	(0)	0	(0)	1	(7)	2	(14)	14
1993–1994	6	(29)	12	(57)	1	(5)	0	(0)	1	(5)	1	(5)	0	(0)	21
1994–1995	2	(15)	10	(77)	0	(0)	0	(0)	0	(0)			1	(8)	13
1995–1996	3	(14)	10	(48)	0	(0)	0	(0)	1	(5)	6	(29)	1	(5)	21
1996–1997	7	(30)	12	(52)	0	(0)	0	(0)	0	(0)	2	(9)	2	(9)	23
1997–1998	2	(18)	9	(82)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	11
1998–1999	5	(45)	6	(55)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	11
1999–2000	0	(0)	2	(40)	0	(0)	0	(0)	0	(0)	3	(60)	0	(0)	5
2000–2001 ^a	3	(17)	15	(83)	0	(0)	0	(0)							
Totals	38	(22)	95	(56)	4	(2)	0	(0)	3	(2)	19	(11)	12	(7)	171

^a Preliminary harvest.

Table 5 Unit 20E grizzly bear percent harvest by transport method, regulatory years 1989–1990 through 2000–2001^a

Regulatory year	Percent harvest by transport method									<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
1989–1990	40	0	10	0	0	0	20	20	10	10
1990–1991	23	0	15	8	0	0	46	0	8	13
1991–1992	27	0	9	18	0	0	36	9	0	11
1992–1993	43	0	0	21	0	7	29	0	0	14
1993–1994	29	0	10	14	0	19	5	24	0	21
1994–1995	23	0	8	31	0	8	15	15	0	13
1995–1996	57	0	10	10	0	4	4	10	4	21
1996–1997	43	4	0	9	0	9	26	9	0	23
1997–1998	45	0	0	45	0	0	0	10	0	11
1998–1999	73	0	0	0	0	18	0	9	0	11
1999–2000	60	0	0	0	0	0	40	0	0	5
2000–2001 ^a	44	0	11	33	0	0	11	0	0	18

^a Preliminary harvest.

Table 6 Blueberry sample areas in Units 20E and 12

Area	Elevation	Slope	Aspect	Primary vegetation	Rainfall (in)		No. berries/plot					
					Blossom production (May–Jun)	Berry production (Jul–Aug)	1	2	3	4	5	\bar{x}
Clearwater	1966	Flat	Flat	spruce/muskeg	— ^a	2.09	14	0	31	84	8	27
7-Mile	1859	Flat	Flat	spruce/willow	— ^a	2.26	0	1	2	0	0	0
Pipeline	1888	5–10 ^a	SSW	spruce/willow	— ^a	2.77	13	6	0	0	0	3
RCA	2197	15–20 ^a	N	spruce/alder	— ^a	— ^b	3	0	0	0	4	1.9
4-Mile	2300	5–10 ^a	S	spruce/tussock	— ^a	2.66	11	7	14	12	11	11
9-Mile	2722	5–10 ^a	NE	1990 burn/willow	— ^a	2.74	23	9	10	12	7	10
Ptarmigan	3643	10–15 ^a	W	willow/alder	— ^a	4.40	9	59	1	14	41	24
Fairplay	3640	10 ^a	SW	willow	— ^a	4.48	14	0	23	2	7	9

^a Rain gauges not working until after blossom production.^b Bear destroyed rain gauge.

SPECIES
MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 25526
JUNEAU, AK 99802-5526

BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNITS: 21B, 21C, and 21D (20,655 mi²)

GEOGRAPHIC DESCRIPTION: Middle Yukon River, including lower Koyukuk River, lower Nowitna River and Melozitna River drainages

BACKGROUND

Grizzly bear density is low to moderate throughout Units 21B, 21C, and 21D, and most of the bears inhabit the mountainous areas. Populations have been stable or slowly increasing, with annual reported harvests of <10 bears per year. Stemming from bear/human conflicts, an equal number of grizzly bears are estimated killed but not reported. These unreported kills most likely occur along the Yukon River during the summer and early fall when fish camps are in operation and bears are attracted to the sites.

Historically, grizzly bears were an important source of food and hides, but hunting effort by local residents has declined in recent years. The registration regulations and fee exemption for the Northwest Alaska Brown Bear Management Area, which includes all of Unit 21D, has improved harvest reporting among local residents.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Protect, maintain and enhance the grizzly bear population and its habitat in concert with other components of the ecosystem.

MANAGEMENT OBJECTIVE

- Manage a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest.

METHODS

Harvest was monitored through sealing requirements of general hunts and reporting requirements of the Northwest Alaska Brown Bear Management Area subsistence hunts. Data collected during sealing included sex, location of harvest, skull measurements, and age if teeth were submitted for aging. Data specific to harvest such as transportation methods, time of harvest, and commercial services utilized were also recorded. Data collected from bears

harvested under subsistence regulations were limited to sex, location of kill and date of harvest. Bear/human conflicts were addressed through education, legal harvest of problem bears, and changes in regulations. Harvest data were summarized by regulatory year (RY = 1 Jul–30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Field observations, nuisance reports, and hunter sightings indicated the population was stable or slowly increasing during the past 10 years. We did not conduct surveys in the area; however, we made population estimates based on known bear densities in similar habitats in other Interior Alaska game management units (Reynolds and Hechtel 1984; Reynolds 1989). Assuming 25 bears/1000 mi² in the highest density bear habitat and 10 bears/1000 mi² in the remainder of the reporting area, we estimated 350–400 grizzly bears inhabited Units 21B, C, and D (Woolington 1997) (21B \approx 50, 21C \approx 100, 21D \approx 200). The Nulato Hills in Unit 21D had the best bear habitat. Unit 21C in its entirety contained the next best grizzly bear habitat. However, because the best habitat in this reporting area included salmon spawning streams, the density estimates based on similar habitats without spawning salmon (Miller 1993), were likely underestimated.

MORTALITY

Harvest

Seasons and Bag Limits.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 21B and 21C One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 21D One bear every regulatory year by registration permit.	1 Sep–15 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	1 Sep–15 Jun	1 Sep–15 Jun

Board of Game Actions and Emergency Orders. During the spring 1996 Board of Game meeting, Unit 21D was included within the Northwest Alaska Brown Bear Management Area. This regulation change allowed a bag limit of 1 bear every regulatory year under a subsistence registration permit. This regulation also required salvage of meat for human consumption, but the hide and skull did not need to be sealed unless they were removed from the management area. If the hide was removed from the management area, the Alaska Department of Fish and Game took the skin of the head and the front claws. At the spring 2000 Board of Game meeting, the season was extended to 15 June for both the subsistence and general seasons in Unit 21D.

The bag limit was also liberalized to allow for the harvest of 1 bear every year under the general hunt.

Hunter Harvest. Grizzly bear harvest in Units 21B, 21C, and 21D was low, and no harvest patterns were clear over the last 6 regulatory years (Table 1). For RY94 through fall 2000, males comprised 68% of the reported harvest, an adequate level to maintain recruitment. More than half the annual harvest was likely unreported. The number of bears taken and not reported was uncertain, but I estimated it was <10 bears per year based on previously reported values. Most were likely taken at fish camps. If this estimate is accurate, the combined mean annual harvest for the last 6 regulatory years was approximately 16 bears/year. The age and sex composition of the reported harvest shows no indication of overexploitation. For RY97–RY99, the average age of harvested bears was 8.9, slightly older than the 32-year average of 8.3 years of age for bears harvested in Units 21B, 21C, 21D and 24. The trend in age of harvested bears was steadily increasing. Based on the estimated sustainable harvest rate of 5–6% in other areas of Interior Alaska (DuBois 1989), an annual total harvest of up to 25 bears seems to be sustainable.

Most grizzly bear harvest was in Unit 21D (Table 2) where the most moose hunting also occurs. Unit 21C sustained the second greatest harvest, which was supported by the relatively high density of bears in that area.

Hunter Residency and Success. There was no pattern of harvest among user groups (Table 3) because most grizzly bears were harvested opportunistically. Mean annual harvest over the past 4 regulatory years was 2.0, 1.8, and 4.3 bears for local, nonlocal, and nonresident hunters, respectively. From RY92 through fall 2000 the mean annual number of successful hunters was 6.9.

Harvest Chronology and Transport Methods. Because harvest was low, no patterns demonstrating greater harvest during the spring versus fall was apparent. Spring bear hunters typically use snowmachines for transportation. Fall bear harvest is often incidental to moose hunting activity, and hunters typically use boats for transportation.

CONCLUSIONS AND RECOMMENDATIONS

The management objective to manage for a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest was achieved. The population was stable or slightly increasing and was capable of supporting an annual harvest of at least 25 bears. The 3-year mean annual harvest (reported and unreported) of 17.7 bears did not exceed the estimated sustainable yield of 25 bears annually. Because males continued to be harvested at more than twice the rate of females and the average age of harvested bears was relatively high, the population was most likely maintaining a high level of reproductive potential with a gradually maturing age-class structure. Although Miller (1993) cautioned about using the proportion of males in the harvest to determine the composition of the population, most bears are harvested in the fall so the bias of a greater number of male bears in the spring harvest was diminished. Unless regulations or hunting habits change dramatically, the harvest will have a negligible effect on grizzly populations in these units. A more accurate assessment of the unreported harvest and a better estimate of the population size should be addressed in the next reporting period.

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Table 1 Units 21B, 21C, and 21D brown bear mortality, regulatory years 1994–1995 through fall 2000

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill ^a									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
<i>1994–1995</i>														
Fall 1994	1	3	0	4	0	0	0	0	5	0	1	3	5	9
Spring 1995	3	1	0	4	0	0	0	0	5	0	3	1	5	9
Total	4	4	0	8	0	0	0	0	10	0	4	4	10	18
<i>1995–1996</i>														
Fall 1995	0	1	0	1	0	0	0	0	5	0	0	1	5	6
Spring 1996	1	2	0	3	0	0	0	0	5	1	2	2	5	9
Total	1	3	0	4	0	0	0	0	10	0	2	3	10	15
<i>1996–1997</i>														
Fall 1996	2	1	0	3	1	0	0	1	5	0	3	1	5	9
Spring 1997	0	0	0	0	0	0	0	0	5	0	0	0	5	5
Total	2	1	0	3	1	0	0	1	10	0	3	1	10	14
<i>1997–1998</i>														
Fall 1997	4	2	3	9	0	0	0	0	5	0	4	2	8	14
Spring 1998	1	0	0	1	0	0	0	0	5	0	1	0	5	6
Total	5	2	3	10	0	0	0	0	10	0	5	2	13	20
<i>1998–1999</i>														
Fall 1998	2	2	0	4	0	0	1	1	5	0	2	2	6	10
Spring 1999	1	0	0	1	0	0	0	0	5	0	1	0	5	6
Total	3	2	0	5	0	0	1	1	10	0	3	2	11	16
<i>1999–2000</i>														
Fall 1999	2	1	0	3	0	0	0	0	5	0	2	1	5	8
Spring 2000	4	0	0	4	0	0	0	0	5	0	4	0	5	9
Total	6	1	0	7	0	0	0	0	10	0	6	1	10	17
<i>2000–2001</i>														
Fall 2000	8	1	0	9	0	0	0	0	5	0	8	1	5	14

^a Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 2 Unit 21 reported brown bear harvest by subunit, regulatory years 1992–1993 through fall 2000^a

Regulatory year	Unit			Total
	21B	21C	21D	
1992–1993	2	0	7	9
1993–1994	0	2	4	6
1994–1995	0	3	5	8
1995–1996	0	0	4	4
1996–1997	1	2	0	3
1997–1998	1	1	8	10
1998–1999	0	2	4	6
1999–2000	1	0	6	7
Fall 2000	1	4	4	9

^a Nonhunting kill not included.

Table 3 Unit 21B, 21C, and 21D successful hunter residency, regulatory years 1992–1993 through fall 2000

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Total successful hunters
1992–1993	2	1	6	9
1993–1994	2	2	2	6
1994–1995	2	3	3	8
1995–1996	2	0	2	4
1996–1997	1	2	0	3
1997–1998	4	1	5	10
1998–1999	2	1	3	6
1999–2000	2	2	3	7
Fall 2000 ^b	0	3	6	9

^a Unit 21B, C, and D residents.

^b Preliminary.

SPECIES
MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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JUNEAU, AK 99802-5526

BROWN BEAR MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 24 (26,092 mi²)

GEOGRAPHIC DESCRIPTION: Koyukuk River drainage upstream from the Dulbi River

BACKGROUND

Grizzly bears are found in moderate numbers throughout Unit 24, with the highest densities in mountainous areas of the Brooks Range in the northern portion of the unit. Specific data on grizzly bear populations in Unit 24 are limited. Information from studies conducted on the northern slopes of the Brooks Range in Unit 26 (Crook 1972; Reynolds 1976; Reynolds and Hechtel 1984) or in the southwestern Brooks Range in Unit 23 (Ballard et al. 1988) has been used to describe bear populations in Unit 24.

The reported harvest since 1961 rarely exceeded 15–20 grizzly bears/year. An exception occurred during the early 1970s when bear hunting on the Alaska Peninsula was closed on an alternate-year basis, resulting in increased bear hunting pressure over the rest of the state. The annual harvest of bears in Unit 24 reached a maximum of 33 during that period. To prevent overharvest, a drawing permit system was in place during 1977–1985.

Previous reports indicate bear populations were stable or were slowly increasing (Woolington 1997). Local hunters (residents of Unit 24) took very few bears, and although the opening of the Dalton Highway to the public increased the number of potential nonlocal hunters, an increase in harvest has not occurred. Historically, grizzly bears were an important source of food and hides for local people. However, with the exception of Anaktuvuk Pass residents, recent hunting effort for grizzly bears by unit residents has declined.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Protect, maintain, and enhance the grizzly bear population and its habitat in concert with other components of the ecosystem.

MANAGEMENT OBJECTIVE

- Manage a grizzly population that will sustain a 3-year mean annual reported harvest of at least 20 bears in the northern portion of the unit (north of Allakaket) and at least 15 bears in the southern (remaining) portion of the unit, with at least 50% males in the reported harvest.

METHODS

We monitored harvest through sealing requirements and information provided by hunters reporting under the Northwest Alaska Brown Bear Management Area permit regulations. Data collected during sealing included sex, location of harvest, skull measurements, and age if teeth were submitted for aging. Data specific to harvest such as transportation methods, time of harvest, and commercial services used were also recorded. Data collected from bears harvested under permit regulations were limited to sex, location, and date of harvest. Harvest data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000). Bear/human conflicts were addressed through education, legal harvest of problem bears and changes in regulations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The grizzly bear population in Unit 24 was likely stable or slowly increasing based on field observations, nuisance reports, and hunter sightings of bears during the past 10 years. However, no surveys were conducted in the area during the reporting period.

Reynolds (1989) estimated densities of 33 bears/1000 mi² within Gates of the Arctic National Park (7000 mi²), 33/1000 mi² in the Brooks Range outside the park (6500 mi²), and 22–33 bears/1000 mi² in the remainder of Unit 24 to the south (14,500 mi²). He estimated 450 bears in northern Unit 24 (north of Allakaket) and 320–480 in the remainder of the unit (south of Allakaket). Earlier work in similar habitats in Interior and Arctic Alaska provided a basis for these estimates (Reynolds 1976; Reynolds and Hechtel 1984).

MORTALITY

Harvest

Seasons and Bag Limits.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 24		
One bear every regulatory year by registration permit.	1 Sep–15 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	1 Sep–15 Jun	1 Sep–15 Jun

Board of Game Actions and Emergency Orders. In 1990 the Board of Game eliminated all requirements for drawing permits and made a uniform season throughout Unit 24, which was aligned with seasons in Units 19, 20 and 21. In 1992 the board established the Northwest Alaska

Brown Bear Management Area that included portions of the unit west of the Dalton Highway Corridor Management Area. The season remained the same, but the bag limit changed to 1 bear/year. Also, all meat had to be salvaged, sealing requirements were waived if the hide and skull remained within the management area, there was no resident tag fee, and aircraft could not be used. During the spring 1996 Board of Game meeting, the portion of Unit 24 within the Dalton Highway Corridor Management Area (DHCMA) was included within the Northwest Alaska Brown Bear Management Area. This action allowed Unit 24 residents residing within the DHCMA to participate in the subsistence hunt and transport bear hides to their residences without sealing. At the spring 2000 Board of Game meeting, the season was extended to 15 June for both the subsistence and general seasons. The bag limit was also liberalized to allow for the harvest of 1 bear every year under the general harvest regulation.

Hunter Harvest. The average annual grizzly bear harvest by hunters for RY93 through RY99 was 12 bears (Table 1). The reported 3-year average harvest (RY97–RY99) for the northern (north of Allakaket) and southern (remaining) portions of the unit was 11.3 and 1.0 bears, respectively. The number of bears taken by fisherman or trappers and not reported is unknown, but was likely <4 bears annually. The 5-year mean annual reported and estimated unreported harvest (RY95–RY99) for the entire unit was 17.8 bears. Of the reported harvest for that same period, 63% were males and 37% were females. Based on the estimated sustainable harvest rate of 5–6% in other areas of Interior Alaska (DuBois 1989), a harvest of 39–47 bears can be sustained in this unit. For RY97 through RY99, the average age of harvested bears was 8.9 years of age, which is just above the 32-year average of 8.3 years of age (for Unit 24 and neighboring Units 21B, 21C, and 21D combined). The trend in age of harvested bears was steadily increasing.

Hunter Residency and Success. Residents of Alaska who did not live in Unit 24 accounted for most of the reported harvest (Table 2). Most of this harvest was incidental to fall moose hunting. Nonresident and local residents took relatively few bears. Each year over the past 6 regulatory years (not including fall 2000) there were 8–16 successful hunters. Although RY00 data was preliminary at the time of this report, at least 21 hunters reported harvesting a bear. This is the highest harvest since 1973.

Harvest Chronology and Transport Methods. From RY93 through RY99 most kills occurred during the fall (84%), incidental to hunting other game species. Over the past 4 regulatory years, transportation to the hunt area was primarily via airplane (27.0%), highway vehicle (26.0%), or boat (18.5%).

CONCLUSIONS AND RECOMMENDATIONS

The management objective of maintaining a population that could sustain the stated level of harvest was achieved. During the reporting period, harvest throughout the unit was very low and was not a factor influencing the population. Although most of the harvest takes place in the northern portion of the unit, the population was capable of sustaining that level of harvest. The southern portion of the unit is probably underutilized at an average harvest rate of 1 bear per year. The objective of maintaining at least 50% male harvest was achieved, with 63% of the harvest being males. The trend of increasing age of harvested bears suggests that the population has not been heavily harvested. Although Miller (1993) cautioned about using the proportion of males in the harvest to determine the composition of the population, most bears in this unit are

harvested in the fall so the bias of a greater number of male bears in the spring harvest was diminished.

Although some localized overhunting could occur in Unit 24, the grizzly bear population as a whole is probably not susceptible to overharvest because hunting is restricted within Gates of the Arctic National Park, where most brown bear habitat occurs. Much of the remainder of the unit is more heavily forested and difficult to hunt. Also, for most hunters hunting with firearms is prohibited within 5 miles of the Dalton Highway.

Education, improved reporting compliance, and cooperative activities with federal agencies will continue to be given high priority during the next reporting period. Age and sex ratios of harvested animals are the standard for monitoring large predator populations in the absence of intensive population investigations, and that information will continue to be collected.

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Table 1 Unit 24 grizzly bear mortality, regulatory years 1993–1994 through fall 2000

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill ^a									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
<i>1993–1994</i>														
Fall 1993	5	0	0	5	0	0	1	1	3	2	5	0	6	11
Spring 1994	3	0	0	3	1	0	0	1	0	0	4	0	0	4
Total	8	0	0	8	1	0	1	2	3	2	9	0	6	15
<i>1994–1995</i>														
Fall 1994	6	8	0	14	0	0	0	0	3	2	6	8	5	19
Spring 1995	1	1	0	2	0	0	0	0	0	0	1	1	0	2
Total	7	9	0	16	0	0	0	0	3	2	7	9	5	21
<i>1995–1996</i>														
Fall 1995	4	4	0	8	0	1	0	1	3	2	4	5	5	14
Spring 1996	0	1	0	1	0	0	0	0	0	0	0	1	0	1
Total	4	5	0	9	0	1	0	1	3	2	4	6	5	15
<i>1996–1997</i>														
Fall 1996	9	4	0	13	0	0	0	0	3	2	9	4	5	18
Spring 1997	1	1	0	2	0	0	0	0	0	0	1	1	0	2
Total	10	5	0	15	0	0	0	0	3	2	10	5	5	20
<i>1997–1998</i>														
Fall 1997	6	2	0	8	0	1	0	1	3	2	6	3	5	14
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6	2	0	8	0	1	0	1	3	2	6	3	5	14
<i>1998–1999</i>														
Fall 1998	8	6	0	14	2	0	0	2	3	2	10	6	5	21
Spring 1999	2	0	0	2	0	0	0	0	0	0	2	0	0	2
Total	10	6	0	16	2	0	0	2	3	2	12	6	5	23

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill ^a									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
<i>1999–2000</i>														
Fall 1999	6	3	0	9	0	0	0	0	3	2	6	3	5	14
Spring 2000	2	1	0	3	0	0	0	0	0	0	2	1	0	3
Total	8	4	0	12	0	0	0	0	3	2	8	4	5	17
<i>2000–2001</i>														
Fall 2000	13	8	0	21	0	0	0	0	3	2	13	8	5	26

^a Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 2 Unit 24 grizzly bear successful hunter residency, regulatory years 1992–1993 through fall 2000

Regulatory year	Local ^a resident	Nonlocal resident	Nonresident	Total successful hunters
1992–1993	3	9	5	17
1993–1994	1	5	2	8
1994–1995	1	11	4	16
1995–1996	1	7	1	9
1996–1997	2	7	6	15
1997–1998	0	4	4	8
1998–1999	2	10	4	16
1999–2000	0	9	3	12
Fall 2000	0	14	7	21

^a Unit residents.

SPECIES
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BROWN BEAR MANAGEMENT REPORT

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To: 30 June 2000

LOCATION

GAME MANAGEMENT UNITS: 25A, 25B, 25D, 26B, and 26C (73,755 mi²)

GEOGRAPHIC DESCRIPTION: Upper Yukon River Drainage and the eastern North Slope of the Brooks Range

BACKGROUND

There was a decline in brown bear numbers during the 1960s resulting primarily from aircraft-supported hunting associated with guiding. As a result, in regulatory year 1971-1972, Units 26B and 26C were closed to brown bear hunting. In subsequent years a variety of regulations were used to limit harvest and increase brown bear numbers. Regulations have been gradually liberalized as populations recovered. A harvest objective of no more than 5% of estimated populations has been used in recent years.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Protect, maintain and enhance brown bear populations and habitat in concert with other components of the ecosystem.
- Provide the opportunity to hunt brown bears under aesthetically pleasing conditions in the eastern Brooks Range.
- Provide the greatest sustained opportunity to participate in hunting brown bears in the upper Yukon and Porcupine drainages.

MANAGEMENT OBJECTIVES

- In Unit 25, maintain a brown bear population capable of sustaining mean annual harvests of 30 bears in Unit 25A and 29 bears in Units 25B and 25D, with a minimum of 60% males in the harvest.
- In Units 26B and 26C, maintain a brown bear population capable of sustaining a mean annual hunter harvest of 13 bears in Unit 26B and 19 bears in 26C, with a minimum of 60% males in the harvest.

METHODS

Brown bear population density estimates for Units 25A, 25B, 25D, 26B, and 26C were revised in 1993 based on studies done in portions of these areas (Reynolds 1976; Garner et al. 1984; Reynolds and Hechtel 1984) or in similar habitat elsewhere (Reynolds 1992), taking into consideration observations by area residents and others with long-term experience in the area. Harvest data are obtained from mandatory sealing documents. Harvest data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Conservative regulations, including a drawing permit system that was in use from 1977 until recently, fostered a recovery in the number of brown bears in Units 25A, 26B, and 26C. During this reporting period bear numbers in Unit 25A were likely stable or increasing and the trend in Units 26B and 26C was likely stable. The long-term population trend in Units 25B and 25D is less well known, but brown bears are common throughout the area and numbers during this period were probably stable or increasing. North Slope residents reported that brown bears were abundant compared to historic levels. Similarly, residents of the Yukon Flats reported that brown bears were scarce during much of this century but were abundant during this reporting period. Numbers have increased in the Yukon Flats area during the last 10–20 years, probably because of a decline in the number of bears harvested by local residents.

Population Size

We estimate there are approximately 1800 brown bears in the eastern Brooks Range and upper Yukon River drainage. We revised population estimates in 1993 and have since used those estimates in our management program (Table 1). The revision was part of a statewide effort to update brown bear population information. We based our estimates on extrapolation from studies in the area or in similar habitat (Reynolds 1976, 1992; Reynolds and Hechtel 1984; Reynolds and Garner 1987), field observations on bear abundance and population trend, and on more accurate calculations of land area based on computer digitization of game management units.

Current estimates of bear numbers are somewhat higher than estimates made prior to 1993, largely because increased knowledge of bear densities and, to a lesser extent, because previous calculations of land area were lower than current measurements.

Distribution and Movements

Brown bears are distributed throughout the area. Densities were generally highest in the foothills of the Brooks Range and lowest on the coastal plain of the North Slope. An artificially high concentration of bears developed near Prudhoe Bay (23 in 1500 mi²; R Shideler, personal communication) because discarded food was available in dumpsters and in the Prudhoe Bay landfill. We observed movement of some brown bears from the mountains to the Porcupine caribou herd calving area on the coastal plain. Brown bears are also known to concentrate near salmon spawning areas on the lower Sheenjek River in Unit 25A.

MORTALITY

Season and Bag Limit.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25A		
RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–20 May	1 Sep–20 May
Units 25B		
RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 25D		
RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	1 Sep–31 May	1 Sep–31 May
Unit 26B		
RESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–31 May	
NONRESIDENT HUNTERS: One bear every 4 regulatory years by drawing permit only; up to 10 permits will be issued.		1 Sep–20 May
Unit 26C		
RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	20 Aug–31 May	20 Aug–31 May

Board of Game Actions and Emergency Orders. There were no regulatory actions during this reporting period. During the previous report period the department issued an emergency order that closed the spring 1998 brown bear season in Unit 26B. This was followed by board actions that reinstated a drawing hunt for nonresidents and changed the season opening date from 20 August to 1 September in this unit. The board also liberalized brown bear hunting regulations in Unit 25D, eliminating the tag fee for resident hunters and establishing a bag limit of 1 bear per year beginning in RY98. These regulation changes occurred because harvests in the area were extremely low and less restrictive regulations could provide for additional hunting opportunity. The estimated sustainable harvest in Unit 25D was 19 bears, whereas the reported annual harvest was <5 bears.

Drawing permits were required for all brown bear hunters in Units 25A, 26B, and 26C beginning in RY77. As bear populations recovered, regulatory changes included applying the permit requirement only to nonresidents and increasing the number of permits issued in some areas. The requirement for a drawing permit for nonresidents only was applied in Units 25A and 26C beginning in RY84, and in Unit 26B beginning in RY87.

The need for the nonresident permit system in Units 25A, 26B, and 26C was reevaluated in 1993. The improved status of bear populations, a low level of harvest relative to a conservative estimate of sustainable harvest, and the cumbersome nature of the permit system prompted the department to propose eliminating the drawing permit system for nonresident hunters in Units 25A and 26C. The Board of Game adopted this proposal in March 1994, with the understanding that harvests would be closely monitored and that the average annual harvest in each unit during a 2-year period should not exceed the estimated sustainable harvest (Table 1).

Similarly, the permit system for nonresidents in Unit 26B was reevaluated and eliminated by the Board of Game beginning in RY96. The board also established an earlier season opening date of 20 August in Units 26B and 26C. This occurred in response to the closure of the September moose hunting season in most of Unit 26 that took effect in RY96. A decline in brown bear harvest during September was expected to accompany the decline in moose hunting activity during this period. These regulations worked as intended in Units 25A and 26C, but resulted in an unacceptable increase in the harvest in Unit 26B. Following the harvest of 25 bears in Unit 26B during RY96, and 25 during fall 1997, the department closed the remainder of the RY97 season by emergency order. A department proposal to restore a drawing permit hunt for nonresident hunters and open the season on 1 September rather than 20 August was passed by the board in March 1998. However, in view of the high harvests during the previous 2 years, no permits were issued to nonresidents in RY98, and only 3 bears were reported taken by resident hunters. Up to 3 drawing permits were issued for nonresident hunters in RY99 and RY00, with a 1 September–31 October open season.

Hunter Harvest. The total annual hunter harvest during RY89 through RY99 ranged from 21–31 (Tables 2–5). Most were taken in Units 25A, 26B and 26C. The overall harvest was nearly stable in recent years, except in Unit 26B where the number of bears taken increased during the previous report period. Increased bear numbers and a gradual liberalization of regulations resulted in harvests that were higher than during the late 1970s and early 1980s but were still below the estimated allowable take of 5%, except in Unit 26B.

Despite high harvests in RY96 and RY97, reports from hunters and casual observations indicated that bears were still common in Unit 26B. However, access and hunting pressure adjacent to the Dalton Highway indicate the situation should be closely monitored. The emergency closure of the spring RY97 season, the reinstatement of the permit requirement for nonresidents in RY98, the decision to not issue permits in RY98, and the change in the season opening date reduced harvest significantly. The reported harvest in Unit 25D continued to be low, despite the more liberal regulations established in RY98.

The proportion of males in the overall harvest was 63% in RY98 and 72% in RY99 (Tables 2–5). The number of female bears taken in Units 25, 26B, and 26C during this reporting period was relatively low. Most bears were taken during fall hunts.

Permit Hunts. Drawing permits were required for nonresident hunters in Unit 26B, but not for Alaska residents. No permits were issued in RY98 and no bears were reported taken by permit holders in RY99 (Table 6).

Hunter Residency and Success. During the RY98 and RY99 seasons combined, residents of Alaska accounted for most of the reported harvest in Units 25B and 25D (71%), as well as in Unit 26B (100%) where no nonresidents were issued drawing permits. During the same period, residents took only 30% of reported harvest in Unit 25A and 9% in Unit 26C (Tables 7–10). Only a few local residents reported taking bears. These figures probably underrepresent the number taken by local hunters, particularly in Units 25A, 25B and 25D, where a few additional bears are taken but not sealed.

Transport Methods. Most brown bears were harvested during aircraft-supported hunts, with a few taken by hunters using snowmachines and boats. Highway vehicles provided access for some hunters near the Dalton Highway.

Other Mortality

The number of brown bears taken and not reported is unknown, but there were occasional reports of bears being killed but not sealed, especially near villages in Unit 25. Some of this harvest probably occurred in defense of life or property. Local residents of this area do not often specifically hunt bears, but commonly encounter them in the course of other activities. Continued efforts are necessary to encourage local residents to report harvest and seal bears.

Relatively little is known about natural mortality of brown bears in northeastern Alaska. Reynolds and Hechtel (1984) observed natural mortality rates in the western Brooks Range of 47% for cubs, 12% for yearlings, and 13% for 2-year-olds.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives were met, and harvests in Units 25A, 25B, 25D, and 26C were at or below levels specified in management objectives. The elimination of nonresident drawing permits in Units 25A and 26C has not resulted in an appreciable increase in harvest. Regulatory changes that took effect in RY98 significantly mitigated the overharvest of brown bear harvest in Unit 26B during RY96 and RY97. Existing management objectives are suitable for the next period, although change in the harvest objective for Unit 25D may result from the development of a moose management plan for this area.

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Table 1 Units 25A, 25B, 25D, 26B, and 26C brown bear population parameters and estimated sustainable harvest, 1993–2000

Unit	Area (mi ²)	Estimated density/100 mi ²	Estimated population size	Allowable harvest @ 5%
25A	21,280	2.8	596	30
25B and D	26,660	2.2	587	29
25 subtotal	47,940		1164	58
26B	15,500	1.7	262	13
26C	10,272	3.8	391	19
26 subtotal	25,772		653	32
Total	73,712	2.5	1843	92

Table 2 Unit 25A brown bear mortality^{ab}, regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported								Total estimated kill						Total
	Hunter kill					Nonhunting kill ^c									
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk		
<i>1989–1990</i>															
Fall 1989	6	6	(50)	0	12	1	1	1	7	(50)	7	(50)	1	15	
Spring 1990	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	6	6	(50)	0	12	1	1	1	7	(50)	7	(50)	1	15	
<i>1990–1991</i>															
Fall 1990	6	3	(33)	0	9	0	0	0	6	(67)	3	(33)	0	9	
Spring 1991	3	2	(40)	0	5	0	0	0	3	(60)	2	(40)	0	5	
Total	9	5	(36)	0	14	0	0	0	9	(64)	5	(36)	0	14	
<i>1991–1992</i>															
Fall 1991	7	3	(30)	2	12	0	0	0	7	(70)	3	(30)	2	12	
Spring 1992	3	0	(0)	0	3	0	0	0	3	(100)	0	(0)	0	3	
Total	10	3	(30)	2	15	0	0	0	10	(77)	3	(23)	2	15	
<i>1992–1993</i>															
Fall 1992	11	5	(31)	0	16	1	0	0	12	(71)	5	(29)	0	17	
Spring 1993	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	11	5	(31)	0	16	1	0	0	12	(71)	5	(29)	0	17	
<i>1993–1994</i>															
Fall 1993	5	3	(38)	0	8	0	0	0	5	(62)	3	(38)	0	8	
Spring 1994	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0	
Total	5	3	(38)	0	8	0	0	0	5	(62)	3	(38)	0	8	
<i>1994–1995</i>															
Fall 1994	9	3	(25)		12	0	0	0	9	(75)	3	(25)	0	12	
Spring 1995	0	1	(100)		1	0	0	0	0	(0)	1	(100)	0	1	
Total	9	4	(31)	0	13	0	0	0	9	(69)	4	(31)	0	13	
<i>1995–1996</i>															

Regulatory year	Reported										Total estimated kill						Total
	Hunter kill					Nonhunting kill ^c											
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk				
Fall 1995	10	4	(29)	0	14	0	0	0	10	(71)	4	(29)	0	14			
Spring 1996	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0			
Total	10	4	(29)	0	14	0	0	0	10	(71)	4	(29)	0	14			
1996–1997																	
Fall 1996	11	9	(45)	0	20	0	0	0	11	(55)	9	(45)	0	20			
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0			
Total	11	9	(45)	0	20	0	0	0	11	(55)	9	(45)	0	20			
1997–1998																	
Fall 1997	6	5	(45)	0	11	1	0	0	7	(58)	5	(42)	0	12			
Spring 1998	0	2	(100)	0	2	0	0	0	0	(0)	2	(100)	0	2			
Total	6	7	(54)	0	13	1	0	0	7	(50)	7	(50)	0	14			
1998–1999																	
Fall 1998	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13			
Spring 1999	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0			
Total	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13			
1999–2000																	
Fall 1999	11	3	(21)	0	14	0	0	0	11	(79)	3	(21)	0	14			
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0			
Total	11	3	(21)	0	14	0	0	0	11	(79)	3	(21)	0	14			

^a Includes permit harvest.

^b No estimate was made of unreported or illegal kills.

^c Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 3 Unit 25B and 25D brown bear mortality^{ab}, regulatory years 1989–19990 through 1999–2000

Regulatory year	Reported													
	Hunter kill					Nonhunting kill ^c			Total estimated kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>1989–1990</i>														
Fall 1989	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Spring 1990	3	0	(0)	0	3	0	0	0	3	(100)	0	(0)	0	3
Total	4	1	(20)	0	5	0	0	0	4	(80)	1	(20)	0	5
<i>1990–1991</i>														
Fall 1990	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
Spring 1991	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	2	3	(60)	0	5	0	0	0	2	(40)	3	(60)	0	5
<i>1991–1992</i>														
Fall 1991	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1992	0	1	(100)	0	1	0	0	0	0	(0)	1	(100)	0	1
Total	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
<i>1992–1993</i>														
Fall 1992	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1993	2	1	(33)	0	3	0	0	0	2	(66)	1	(33)	0	3
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
<i>1993–1994</i>														
Fall 1993	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Spring 1994	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
<i>1994–1995</i>														
Fall 1994	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Spring 1995	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
<i>1995–1996</i>														

Regulatory year	Reported													
	Hunter kill					Nonhunting kill ^c			Total estimated kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
Fall 1995	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1996	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
1996–1997														
Fall 1996	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
1997–1998														
Fall 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Spring 1998	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
1998–1999														
Fall 1998	0	0	(0)	1	1	0	0	0	0	(0)	0	(0)	1	1
Spring 1999	1	0	(0)	0	0	0	0	0	1	(100)	0	(0)	0	1
Total	1	0	(0)	1	2	0	0	0	1	(100)	0	(0)	1	2
1999–2000														
Fall 1999	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 2000	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	4	2	(33)	0	6	0	0	0	4	(67)	2	(33)	0	6

^a Includes permit harvest.

^b No estimate was made of unreported or illegal kills.

^c Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 4 Unit 26B brown bear mortality^{ab}, regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported													
	Hunter kill					Nonhunting kill ^c			Total estimated kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
<i>1989–1990</i>														
Fall 1989	6	5	(45)	0	11	1	0	0	7	(58)	5	(42)	0	12
Spring 1990	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Total	9	6	(40)	0	15	1	0	0	10	(63)	6	(37)	0	16
<i>1990–1991</i>														
Fall 1990	3	5	(62)	0	8	0	0	0	3	(38)	5	(62)	0	8
Spring 1991	4	0	(0)	0	4	0	0	0	4	(100)	0	(0)	0	4
Total	7	5	(42)	0	12	0	0	0	7	(58)	5	(42)	0	12
<i>1991–1992</i>														
Fall 1991	8	5	(38)	0	13	0	0	0	8	(62)	5	(38)	0	13
Spring 1992	4	0	(0)	0	4	0	0	0	4	(100)	0	(0)	0	4
Total	12	5	(29)	0	17	0	0	0	12	(71)	5	(29)	0	17
<i>1992–1993</i>														
Fall 1992	7	4	(36)	0	11	0	1	0	7	(58)	5	(42)	0	12
Spring 1993	1	1	(50)	1	3	0	0	0	1	(50)	1	(50)	1	3
Total	8	5	(38)	1	14	0	1	0	8	(53)	6	(40)	1	15
<i>1993–1994</i>														
Fall 1993	4	5	(56)	1	10	0	1	0	4	(40)	6	(60)	1	11
Spring 1994	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	5	6	(55)	1	12	0	1	0	5	(42)	7	(58)	1	13
<i>1994–1995</i>														
Fall 1994	6	4	(40)	0	10	0	0	0	6	(60)	4	(40)	0	10
Spring 1995	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	8	4	(33)	0	12	0	0	0	8	(66)	4	(33)	0	12
<i>1995–1996</i>														

Regulatory year	Reported													
	Hunter kill					Nonhunting kill ^c			Total estimated kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
Fall 1995	7	2	(22)	0	9	0	0	0	7	(78)	2	(22)	0	9
Spring 1996	0	2	(100)	0	2	0	0	0	0	(0)	2	(100)	0	2
Total	7	4	(36)	0	11	0	0	0	7	(64)	4	(36)	0	11
<i>1996–1997</i>														
Fall 1996	15	7	(32)	0	22	1	0	0	16	(70)	7	(30)	0	23
Spring 1997	1	2	(66)	0	3	0	0	0	1	(33)	2	(66)	0	3
Total	16	9	(36)	0	25	1	0	0	17	(65)	9	(35)	0	26
<i>1997–1998</i>														
Fall 1997	17	8	(32)	0	25	0	1	0	17	(65)	9	(35)	0	26
Spring 1998	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	17	8	(32)	0	25	0	1	0	17	(65)	9	(35)	0	26
<i>1998–1999</i>														
Fall 1998	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
Spring 1999	0	0	(0)	0	0	0	1	0	0	(0)	0	(0)	0	0
Total	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
<i>1999–2000</i>														
Fall 1999	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4

^a Includes permit harvest.

^b No estimate was made of unreported or illegal kills.

^c Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 5 Unit 26C brown bear mortality^{ab}, regulatory years 1989–1990 through 1999–2000

Regulatory year	Reported										Total estimated kill					Total
	Hunter kill					Nonhunting kill ^c										
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk			
1989–1990																
Fall 1989	1	1	(50)	0	2	1	0	0	2	(67)	1	(33)	0	3		
Spring 1990	0	0	(0)	0	0	0	1	0	0	(0)	1	(100)	0	1		
Total	1	1	(50)	0	2	1	1	0	2	(50)	2	(50)	0	4		
1990–1991																
Fall 1990	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4		
Spring 1991	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2		
Total	5	1	(17)	0	6	0	0	0	5	(83)	1	(17)	0	6		
1991–1992																
Fall 1991	4	2	(33)	0	6	2	0	2	6	(75)	2	(25)	2	10		
Spring 1992	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2		
Total	5	3	(38)	0	8	2	0	2	7	(70)	3	(30)	2	12		
1992–1993																
Fall 1992	0	5	(100)	0	5	0	0	0	0	(0)	5	(100)	0	5		
Spring 1993	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1		
Total	1	5	(83)	0	6	0	0	0	1	(17)	5	(83)	0	6		
1993–1994																
Fall 1993	6	0	(0)	0	6	0	0	0	6	(100)	0	(0)	0	6		
Spring 1994	0	1	(100)	0	1	0	0	0	0	(0)	1	(100)	0	1		
Total	6	1	(14)	0	7	0	0	0	6	(86)	1	(14)	0	7		
1994–1995																
Fall 1994	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3		
Spring 1995	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1		
Total	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4		
1995–1996																

Regulatory year	Reported													
	Hunter kill					Nonhunting kill ^c			Total estimated kill					
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
Fall 1995	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
Spring 1996	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
<i>1996–1997</i>														
Fall 1996	5	3	(38)	0	8	0	0	0	5	(63)	3	(38)	0	8
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)	0	8	0	0	0	5	(63)	3	(38)	0	8
<i>1997–1998</i>														
Fall 1997	4	2	(33)	0	6	0	0	0	4	(66)	2	(33)	0	6
Spring 1998	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8
<i>1998–1999</i>														
Fall 1998	2	1	(33)	0	3	0	0	0	2	(67)	1	(33)	0	3
Spring 1999	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	1	(33)	0	3	0	0	0	2	(67)	1	(33)	0	3
<i>1999–2000</i>														
Fall 1999	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8

^a Includes permit harvest.

^b No estimate was made of unreported or illegal kills.

^c Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

Table 6 Unit 26B brown bear harvest data by permit hunt, regulatory years 1987–1988 through 1999–2000

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunt	Percent successful hunters	Males	Females	Unk	Total harvest
Fall hunts									
(DB288)	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1988–1989	n/a	n/a	25	75	1	2	0	3
	1989–1990	n/a	n/a	n/a	n/a	n/a	n/a	4	4
	1990–1991	6	33	0	67	1	2	1	4
	1991–1992	6	33	0	67	4	0	0	4
	1992–1993	6	50	0	50	1	3	0	4
	(DB987)	6	50	17	33	0	2	0	2
	1994–1995	6	50	0	50	3	0	0	3
	1995–1996	6	0	17	83	4	1	0	5
	1996–1997 ^a								
	1997–1998 ^a								
	1998–1999	0	0	0	0	0	0	0	0
	1999–2000	3	100	0	0	0	0	0	0
Spring hunts									
(DB297)	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1988–1989	n/a	n/a	n/a	n/a	3	0	0	3
	1989–1990	n/a	n/a	n/a	n/a	0	0	3	3
	1990–1991	4	0	0	100	4	0	0	4
	1991–1992	4	25	0	75	3	0	0	3
	1992–1993	2	0	50	50	0	0	1	1
	(DB997)	0	0	0	0	0	0	0	0
	1994–1995	0	0	0	0	0	0	0	0
	1995–1996	0	0	0	0	0	0	0	0
	1996–1997 ^a								
	1997–1998 ^a								
	1998–1999	0	0	0	0	0	0	0	0
	1999–2000	0	0	0	0	0	0	0	0
Totals for	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunt	Percent successful hunters	Males	Females	Unk	Total harvest
all permit hunts	1988–1989	n/a	n/a	n/a	n/a	4	2	0	6
	1989–1990	n/a	n/a	n/a	n/a	n/a	n/a	7	7
	1990–1991	10	20	0	80	5	2	1	8
	1991–1992	10	30	0	70	7	0	0	7
	1992–1993	8	38	12	50	1	3	1	4
	1993–1994	6	50	17	33	0	2	0	2
	1994–1995	6	50	0	50	3	0	0	3
	1995–1996	6	0	17	83	4	1	0	5
	1996–1997 ^a								
	1997–1998 ^a								
	1998–1999 ^a	0	0	0	0	0	0	0	0
	1999–2000	3	100	0	0	0	0	0	0
	2000–2001 ^b	2							

^a The nonresident drawing hunt in Unit 26B was eliminated in regulatory year 1996–1997 and reinstated in regulatory year 1998–1999.

^b Preliminary data.

Table 7 Unit 25A residency of successful brown bear hunters^a, regulatory years 1985–1986 through 1999–2000

Regulatory year	Local ^b resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	1 (11)	2 (22)	6 (67)	9
1986–1987	0 (0)	6 (50)	6 (50)	12
1987–1988	0 (0)	3 (23)	10 (77)	13
1988–1989	1 (5)	8 (38)	12 (57)	21
1989–1990	1 (8)	2 (17)	9 (75)	12
1990–1991	2 (14)	6 (43)	6 (43)	14
1991–1992	1 (7)	4 (27)	10 (67)	15
1992–1993	0 (0)	6 (38)	10 (62)	16
1993–1994	0 (0)	4 (50)	4 (50)	8
1994–1995	0 (0)	8 (62)	5 (38)	13
1995–1996	0 (0)	4 (29)	10 (71)	14
1996–1997	0 (0)	2 (10)	18 (90)	20
1997–1998	0 (0)	3 (23)	10 (77)	13
1998–1999	1 (7)	3 (23)	9 (69)	13
1999–2000	0 (0)	4 (29)	10 (71)	14

^a Includes permit harvest.

^b Includes only residents of the subunit.

Table 8 Unit 25B and 25D residency of successful brown bear hunters^a, regulatory years 1985–1986 through 1999–2000

Regulatory year	Local ^b resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	0 (0)	0 (0)	2 (100)	2
1986–1987	0 (0)	1 (25)	3 (75)	4
1987–1988	0 (0)	2 (40)	3 (60)	5
1988–1989	1 (25)	0 (0)	3 (75)	4
1989–1990	1 (20)	1 (20)	3 (60)	5
1990–1991	1 (20)	3 (60)	1 (20)	5
1991–1992	0 (0)	0 (0)	2 (100)	2
1992–1993	1 (25)	0 (0)	3 (75)	4
1993–1994	0 (0)	2 (100)	0 (0)	2
1994–1995	2 (50)	2 (50)	0 (0)	4
1995–1996	0 (0)	1 (50)	1 (50)	2
1996–1997	1 (33)	0 (0)	2 (67)	3
1997–1998	0 (0)	0 (0)	0 (0)	0
1998–1999	1 (50)	0 (0)	1 (50)	2
1999–2000	4 (80)	0 (0)	1 (20)	5

^a Includes permit harvest.

^b Includes only residents of the subunit.

Table 9 Unit 26B residency of successful brown bear hunters^a, regulatory years 1985–1986 through 1999–2000

Regulatory year	Local ^b resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	0 (0)	0 (0)	6 (100)	6
1986–1987	0 (0)	2 (40)	3 (60)	5
1987–1988	0 (0)	6 (46)	7 (54)	13
1988–1989	0 (0)	4 (44)	5 (56)	9
1989–1990	0 (0)	7 (47)	8 (53)	15
1990–1991	0 (0)	4 (33)	8 (66)	12
1991–1992	0 (0)	10 (59)	7 (41)	17
1992–1993	0 (0)	9 (64)	4 (29)	13
1993–1994	0 (0)	10 (83)	2 (17)	12
1994–1995	0 (0)	9 (75)	3 (25)	12
1995–1996	0 (0)	6 (55)	5 (45)	11
1996–1997	1 (4)	11 (44)	13 (57)	25
1997–1998	0 (0)	9 (35)	16 (64)	25
1998–1999	0 (0)	3 (100)	0 (0)	3
1999–2000	0 (0)	4 (100)	0 (0)	4

^a Includes permit harvest.

^b Includes only residents of the subunit.

Table 10 Unit 26C residency of successful brown bear hunters^a, regulatory years 1985–1986 through 1999–2000

Regulatory year	Local ^b resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	0 (0)	4 (67)	2 (33)	6
1986–1987	0 (0)	6 (67)	3 (33)	9
1987–1988	0 (0)	5 (63)	3 (37)	8
1988–1989	0 (0)	3 (50)	3 (50)	6
1989–1990	0 (0)	0 (0)	2 (100)	2
1990–1991	0 (0)	3 (50)	3 (50)	6
1991–1992	0 (0)	4 (50)	4 (50)	8
1992–1993	1 (17)	1 (17)	4 (66)	6
1993–1994	1 (14)	6 (86)	0 (0)	7
1994–1995	0 (0)	2 (50)	2 (50)	4
1995–1996	0 (0)	0 (0)	7 (100)	7
1996–1997	0 (0)	4 (50)	4 (50)	8
1997–1998	2 (25)	0 (0)	6 (75)	8
1998–1999	0 (0)	0 (0)	3 (100)	3
1999–2000	0 (0)	1 (12)	7 (88)	8

^a Includes permit harvest.

^b Includes only residents of the subunit.